Code No. | Symbol Number: _____ Invigilator's Sign: _____ Superintendent's Sign: _____

Symbol No. in Words: _____

Faculty: Engineering **Level: Bachelor** **Exam Year: 2080,Mangsir** **Year/Part :II/I**

Program: Electrical and Electronics **Subject: ELECTRIC CIRCUIT THEORY (EG503EE)**

GROUP A (Multiple Choice Questions) **[10x1=10]**

i. Answers should be given by filling the Objective Answer Sheet.
ii. Rough can be done in the main answer sheet
iii. Maximum time of 20 minutes within the total time is given for this group.

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1. An inductor, when energized at t<0, will act as a …….. at $t=0^+$.
a) Voltage Source
b) Short Circuit
c) Open Circuit
d) Current source

2. The time constant of a RL series circuit is expressed as:
a) R/L
b) L/R
c) RL
d) 1/RL

3. The resonant angular frequency for a parallel RLC circuit is expressed as:
a) $\omega_r = \frac{1}{2\pi fC}$
b) $\omega_r = \frac{1}{2\pi LC}$
b) $\omega_r = \frac{1}{\sqrt{LC}}$
d) $\omega_r = \frac{1}{2\pi\sqrt{LC}}$

4. The expression sin ωt can also be re-written as:
a) $\frac{e^{jwt}+e^{-jwt}}{2}$
b) $\frac{e^{jwt}-e^{-jwt}}{2}$
c) $\frac{e^{jwt}+e^{-jwt}}{2j}$
d) $\frac{e^{jwt}-e^{-jwt}}{2j}$

5. In frequency domain, $I(s) = \frac{s}{s^2+4}$. Then in time domain,
a) i(t) = cos 2t
b) $i(t) = e^{-2t}\cos 2t$
b) i(t) = sin 2t
d) $i(t) = e^{-2t}\sin 2t$

6. The poles of the transfer function $G(s) = \frac{S(S-2)}{(s^2+5s+6)}$ are:
a) at 0 and 2
b) at 2 and 3
b) at 0 and -2
d) at -2 and -3

7. The starting point of Bode Magnitude Plot at ω = 1 rad/s is taken as:
a) $10 \log_e k$
b) $20 \log_e k$
b) c) $10 \log_{10} k$
d) $20 \log_{10} k$

8. The periodicity of a function cos t is:
a) $\pi/2$
b) π
c) 2π
d) not a periodic function

9. Inverse Transfer Admittance of any electrical two-port network can be calculated as:
a) V_1 / V_2
b) I_2 / V_1
b) I_1 / V_2
d) V_1 / I_2

10. The overall transmission parameters of a cascaded two-port network is:
a) $\begin{bmatrix} A_1+A_2 & B_1+B_2 \\ C_1+C_2 & D_1+D_2 \end{bmatrix}$
c) $\begin{bmatrix} A_1A_2 & B_1B_2 \\ C_1C_2 & D_1D_2 \end{bmatrix}$
b) $\begin{bmatrix} A_1 & B_1 \\ C_1 & D_1 \end{bmatrix}\begin{bmatrix} A_2 & B_2 \\ C_2 & D_2 \end{bmatrix}$
d) $\begin{bmatrix} A_1/A_2 & B_1/B_2 \\ C_1/C_2 & D_1/D_2 \end{bmatrix}$

Multiple Choice Questions' Answer Sheet

Code No. _____ Marks Secured: _____

Corrected Fill: Ⓐ ● Ⓒ Ⓓ

Incorrected Fill: ⊗ Ⓑ ● ✓

In Words: _____

Examiner's Sign: _____ Date: _____

Scrutinizer's Marks: _____

In Words: _____

Scrutinizer's Sign: _____ Date: _____

1.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	6. Ⓐ Ⓑ Ⓒ Ⓓ
2.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	7. Ⓐ Ⓑ Ⓒ Ⓓ
3.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	8. Ⓐ Ⓑ Ⓒ Ⓓ
4.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	9. Ⓐ Ⓑ Ⓒ Ⓓ
5.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	10. Ⓐ Ⓑ Ⓒ Ⓓ

MANMOHAN TECHNICAL UNIVERSITY
Office of the Controller of Examinations
Budhiganga-4, Morang, Province 1, Nepal

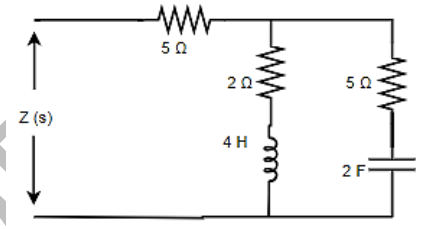
Faculty: Engineering | **Exam Year:2080 Mangsir** | **Year/Part: II/I**
Program: Electrical and Electronics | **Level: Bachelor** | **F.M.: 50**
Subject: ELECTRIC CIRCUIT THEORY (EG503EE) | **Time: 3 Hours** | **P.M.: 20**

- ✓ *Group A contains Multiple Choice Questions of 10 marks.*
- ✓ *Candidates are required to give their answers in their own words as far as practicable.*
- ✓ *The figures in the margin indicate Full Marks.*
- ✓ *Assume suitable data if necessary*.

Group 'B'

Short Answer Questions (Attempt any EIGHT questions only.)
(8×2=16)

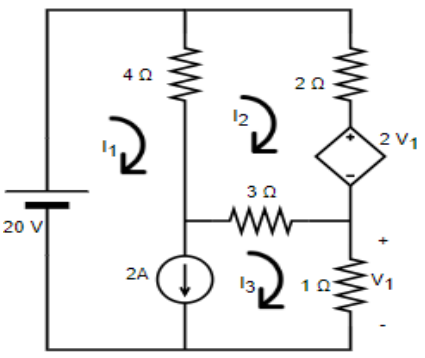
1. What are the initial conditions for Inductor and Capacitors under energized and de-energized conditions?
2. Find the time constant for a series RL circuit under step response.
3. Find the partial fraction expression for: G(s) = $\frac{2s}{s^2+3s+2}$
4. Convert the following expression in exponential form: cos βt – j sin βt
5. Find the poles and zeros of the transfer function: $I(s) = \frac{(s^2-3s+2)}{(s^3-5s^2)(s^2+7s+6)}$
6. How does a high pass filter circuit work?
7. Describe hybrid parameters for a two-port electrical network.
8. Write the expression for the Fourier series and its coefficients for a periodic signal.
9. Find the Driving point Impedance Z(s) for the following circuit:



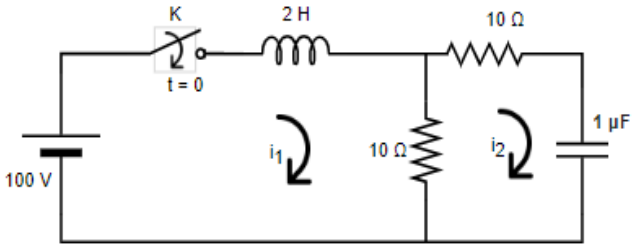
Group 'C'

Long Answer Questions (Attempt any SIX questions only.) **(6×4=24)**

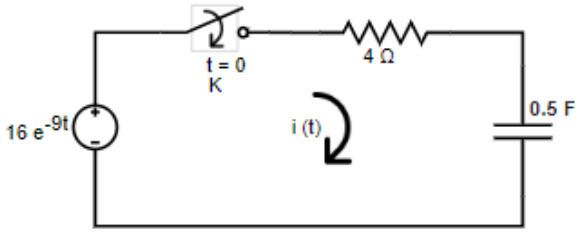
1. Find the currents I_1, I_2 and I_3 using Matrix method.



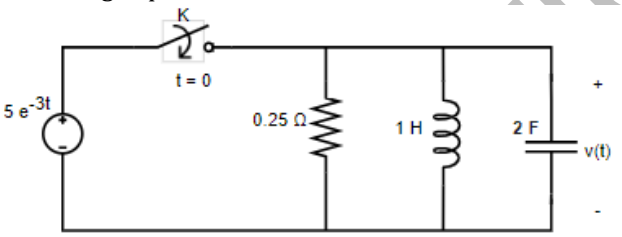
2. The switch K is initially open for a long time and it is closed at t=0.
Find i_1, i_2, $\frac{di_1}{dt}$, $\frac{di_2}{dt}$ at t = 0^+.



3. Solve for i(t) at t>0 using Classical Method.



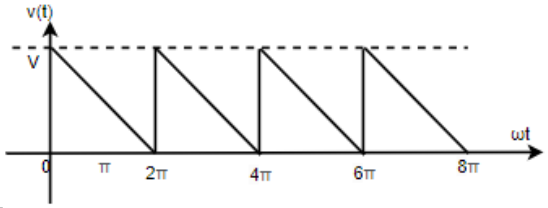
4. Solve for v(t) at t>0 using Laplace Transform Method.



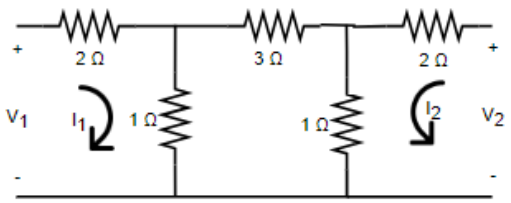
5. Draw the Bode Magnitude Plot Diagram for the following network function:

$$H(s) = \frac{20\,(s+1)}{s(s+5)(s+15)}$$

6. Find the Trigonometric form of Fourier series for the following periodic waveform:



7. Find the T – parameters for the two-port network shown below.



ALL THE BEST