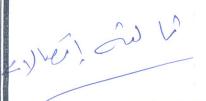
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FACULTY OF ELECTRONIC ENGINEERING, MENOUF ELECTRONIC AND ELECTRICAL COMMUICATIONS DEPARTMENT

SUBJECT: NETWORK THEORY, 3rd YEAR TIME ALLOWED: THREE HOURS

DATE OF EXAMINATION: Sunday, 29/12/2019 TOTAL MARKS: 70 MARKS

ANSWER THE FOLLOWING QUESTIONS

- 1. Find the two Foster realizations of the driving point impedance Z(s) if $\left|Z(j\omega)\right|^2 = (\omega^4 + 45\omega^2 + 324)/(\omega^4 + 17\omega^2 + 16)$ (14 Marks)
- 2. Synthesize the transfer function $H(s) = V_2(s) / V_1(s)$ of a singly 1- Ω terminated FTN using the two port parameters if

$$\left|H(j\omega)\right|^2 = \omega^6 / (\omega^6 + 1)$$
 (8 Marks)

- 3.a: From the first principles determine the element values required for a symmetrical T-section LPF, suitable for insertion in a 600 Ω , if the attenuation, α , at a frequency f = 2 MHz, is 22.87819259 dB.
- 3.b: Using the results obtained in (3.a), determine the magnitude of Z_{cT} at $f = 2 f_c$ and the phase shift, β , at $f = f_c$. (8 Marks)
- 4. If the transfer function is $H(s) = V_2(s) / I_1(s)$, the impedance level is $10^3 \Omega$ and the amplitude function of the Butterworth filter is $\left|H(j\omega)\right|^2 = 1/(1+\omega^{2n})$; n=1,2,3, design a 3^{rd} order Butterworth to stop all radient frequencies between 10^4 rad/sec.

 (20 Marks)
- 5. If the transfer function is $H(s) = V_2(s) / V_1(s)$, $\omega_c = 10^4$ rad/sec., $R_o = 1 \Omega$ and the ripple in the pass-band must not exceed 0.5 dB, synthesize a 3^{rd} order Chebyshev high-pass filter. (20 Marks)

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