D 51028 (Pages : 3)

Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, NOVEMBER 2013

EC 09 303 / PTEC 09 302—NETWORK ANALYSIS AND SYNTHESIS

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*

1. State Thevenin's theorem.
2. Define transfer function.
3. Draw frequency response of a low-pass filter.
4. Test whether given polynomial $p(s) = s^3 + 2s^2 + 4s + 2$ is Hurwitz.
5. State necessary conditions for a function to be positive real.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

1. Obtain the step response of a parallel RC circuit.
2. Two coupled coils have self inductances $L_1 = 10$ mH and $L_2 = 20$ mH. The coefficient of coupling is 0.75 in air. Find voltage induced in the second coil and flux of the first coil, provided second coil has 500 turns and circuit current is given by $i_1 = 2\sin 314\,t$ Amps.
3. Express Y-parameters of a two port network in terms of Z-parameters.
4. Mention properties of R-C driving point impedance function.
5. Draw transfer characteristics of a low-pass butterworth filter.
6. Find driving point impedance for the network shown in Figure 1.

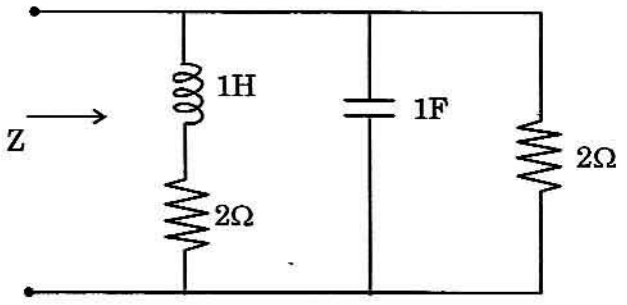


Figure 1

(4 × 5 = 20 marks)

Turn over

Part C

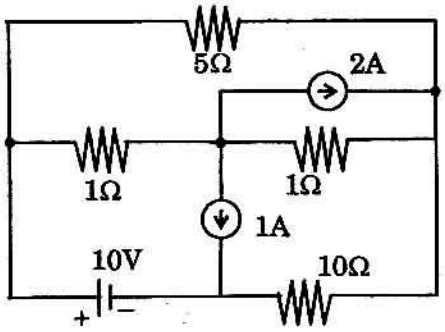
Answer any **one** *question from each module.*

Module I

1. State and prove maximum power transfer theorem. (10 marks)

Or

2. Find current through 10 Ω resistor using superposition theorem for Figure 2.



(10 marks)

Module II

3. Explain the different types of interconnection of two port networks. (10 marks)

Or

4. Given the transform current is $I(s) = \frac{5s}{(s+2)(s^2+2s+2)}$. Draw the pole-zero plot and obtain its time domain response.

(10 marks)

Module III

5. Show that half power point of a Chebyshev low-pass amplitude response is at $\omega = \cosh \beta_\epsilon$ for $\epsilon << 1$.

(10 marks)

Or

6. Synthesize $n = 3$ and $n = 4$ Butterworth responses as transfer impedances terminated in a load of 600 Ω with a cut-off frequency of 10^6 rad/sec.

(10 marks)

MODULE IV

7. Consider driving point impedance $Z(s)=\frac{(s+3)(s+5)}{s(s+4)}$. Synthesize RC network using cauer forms I and II.

(10 marks)

Or

8. A function is given by $Z(s)=\frac{(s^2+1)(s^2+16)}{s(s^2+4)}$. Realize LC network using Foster forms I and II.

(10 marks)

[4 × 10 = 40 marks]