D 51428 **(Pages 3)** **Name**.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, DECEMBER 2008

EC 2K 302—ELECTRICAL CIRCUITS AND NETWORK THEORY

Time : Three Hours **Maximum : 100 Marks**

Answer **all** *questions.*

I. (a) State the following theorems and explain :—

(i) Thevenin's theorem.

(ii) Super position theorem.

(b) Explain about zero input response for first order circuits.

(c) Write *s*-domain equations in matrix form and construct the corresponding circuit in Fig. 1.

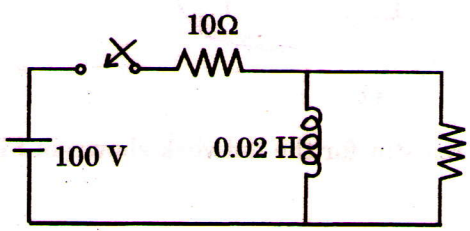

Fig. 1.

(d) Explain frequency response calculation from pole-zero plot.

(e) The Z-parameters of a two-port network are $Z_{11} = 10\ \Omega$, $Z_{22} = 15\ \Omega$, $Z_{12} = Z_{21} = 5\Omega$. Find the equivalent T-network and ABCD parameters.

(f) Define :

(i) Characteristic impedance ;

(ii) Image impedance ;

(iii) Propagation constant.

(g) Explain the properties of positive real functions.

(h) Explain the synthesis of R.C. network by the Cauer method.

(8 × 5 = 40 marks)

II. (a) Show that the optimum load impedance for maximum power transfer is equal to the complex conjugate of source impedance.

Or

Turn over

(b) Using Norton's theorem find the current I in the following circuit in Fig. 2.

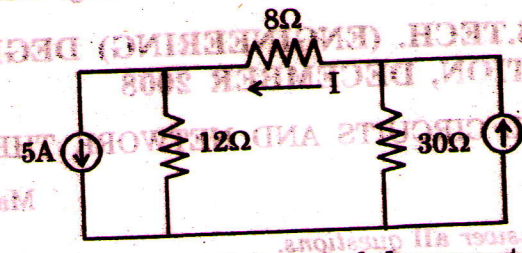

Fig. 2.

III. (a) In the circuit shown in Fig. 3 below, find the currents which result when the switch is closed using Laplace transform.

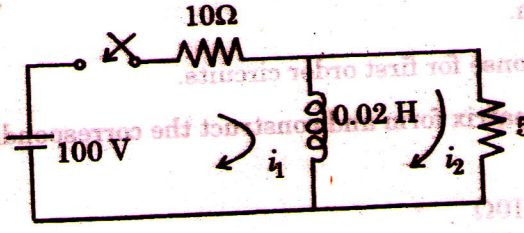

Fig. 3.

Or

(b) Find the voltage across the 10Ω resistor for the network shown in Fig. 4 below.

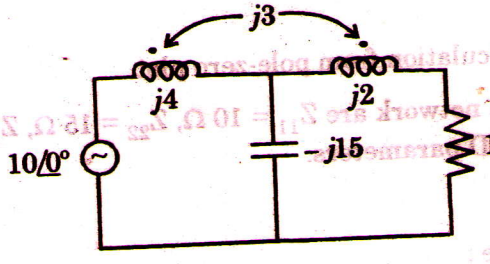

Fig.4.

IV. (a) Find the *h*-parameters of the network shown in Fig. 5 below.

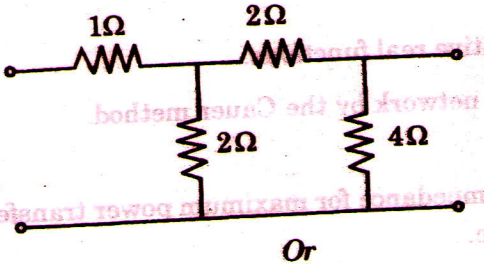

Fig. 5.

Or

(b) Design a *m*-derived high pass filter with a cut-off frequency of 10 kHz, design impedance of 600 Ω and $m = 0.3$.

V. (a) (i) Check the positive realness of the function $z(s) = \frac{s+3}{s+1}$. (6 marks)

(ii) Check whether the function $z(s) = s^4 + s^3 + 6s^2 + 3s + 4$ is Hurwitz or not. (9 marks)

Or

(b) Find the first and second Foster forms of the function $z(s) = \frac{(s+1)(s+3)}{s(s+2)}$. (15 marks)

[4 × 15 = 60 marks)]