D 1816 (3 pages) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION

DECEMBER 2004

EC-2K-302 – ELECTRIC CIRCUITS AND NETWORK THEORY

(New Scheme)

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

Answer all **eight** *questions in I.*

I. (a) Find the Norton's equivalent for the circuit shown in Fig.1 at terminals AB.

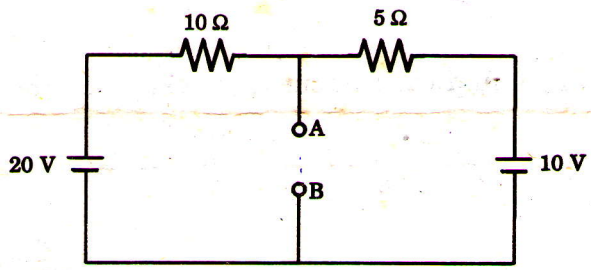

Fig. 1

(b) Find the impulse response of a simple RC network.

(c) What is convolution integral ? Explain.

(d) What are the necessary conditions to be satisfied by the transfer function ?

(e) What are the characteristics of symmetrical network ?

(f) Draw the *n*-parameter equivalent circuit for a two-port network. Explain its parameters.

(g) What are the properties of positive real function ?

(h) What are the applications of maximum module theorem ?

(8 × 5 = 40 marks)

Turn over

Answer **either** *(a)* **or** *(b) of questions II to V.*

II. (a) Determine voltage V which causes the current I_1 to be zero in the following Fig.2.

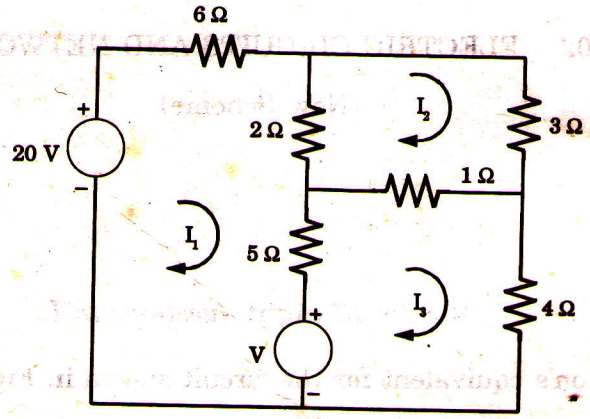

Fig. 2

Or

(b) In the following Fig.3, find the current transient when the switch is closed at $t = 0$.

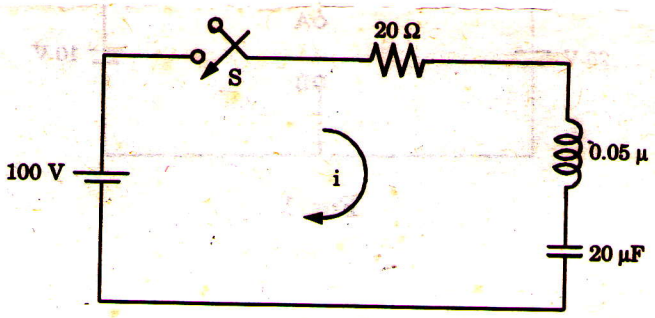

Fig. 3

(15 marks)

III. (a) Explain how R, L and C can be transformed as admittance in S-domain. (6 marks)

(b) Using Mesh analysis find the value of V_2 in the following Fig.4 such that current in the impedance $(3 + j4\ \Omega)$ is zero.

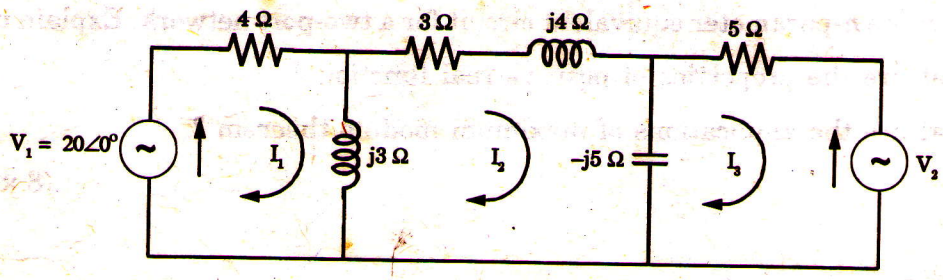

Fig. 4

(9 marks)

Or

(b) Draw the pole zero diagram for the given network function I(s) and hence obtain $i(t)$

$$I(s) = \frac{20s}{(s+5)(s+2)}.$$ (9 marks)

Determine the transfer functions $Z_{21}(s)$ and $G_{21}(s)$ for the network in Fig.5.

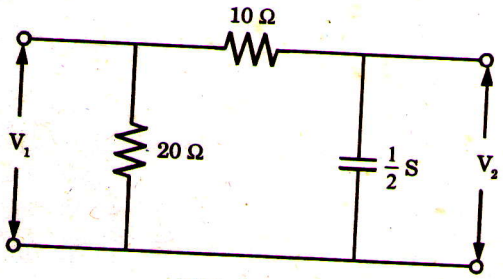

Fig. 5

IV. (a) Find the characteristic impedance and propagation constant of symmetrical T and π networks. What is the relation between Z_0 of T and π networks ? (6 marks)

Or

(b) Design a composite row pass filter for the following specifications with suitable terminating half section.

$f_c = 4$ kHz $f_{\infty 1} = 5$ kHz R = 500 Ω.

V. (a) Explain about Strun's theorem. (15 marks)

Determine whether the following polynomial is a Hurwitz polynomial

$$P(s) = 2s^6 + s^5 + 13s^4 + 6s^3 + 56s^2 + 25s + 25.$$

Or

(b) Design the first and second Foster form LC network for the following transfer function.

$$Z(s) = \frac{(s^2+1)(s^2+9)}{s(s^2+4)}.$$

(15 marks)

(4 × 15 = 60 marks)