

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION DECEMBER 2003

EC 2K 302—ELECTRICAL CIRCUITS AND NETWORK THEORY

Time : Three Hours

Maximum 100 Marks

Answer **all the eight** questions in I. Each question carries 5 marks.
Answer (a) **or** (b) of questions II to V. Each question carries 15 marks.

- I. (a) State Thevenin's and Norton's theorems. Explain. (5 marks)
 (b) How will a second order circuit respond to a step input? (5 marks)
 (c) State convolution theorem and explain its application. (5 marks)
 (d) Write the nodal admittance matrix of a simple network (of your choice) and explain how do you arrive at the matrix. (5 marks)
 (e) State reciprocity theorem and explain its uses. (5 marks)
 (f) What is image impedance? How is it different from characteristic impedance? (5 marks)
 (g) State Sturm's theorem and explain. (5 marks)
 (h) Explain how is synthesis of LC network carried out. (5 marks)
- II. (a) For the circuit shown in Fig. 1, determine the total impedance, total current and phase angle. (15 marks)

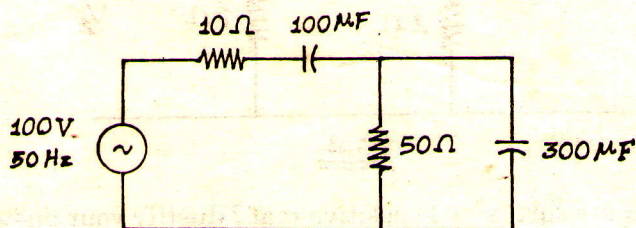


FIG.1.

Or

- (b) A voltage $f(t) = 141.4 \sin \omega t$ is applied to the circuit shown in Fig.2. The circuit dissipates 450 W at a lagging power factor, when the volt meter and ammeter readings are 100 V and 6 A, respectively. Calculate the circuit constants.

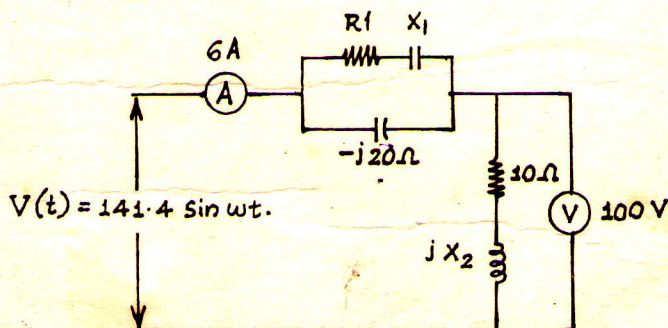


FIG.2.

(15 marks)

Turn over

- III. (a) How are step function and other functions derived from it helpful as building block in constructing other waveforms? Illustrate with two examples.

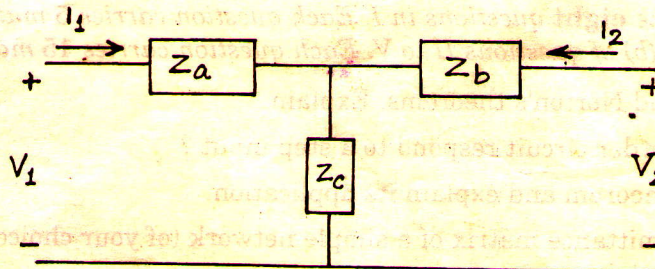
(15 marks)

Or

- (b) What are the restrictions on pole zero locations for driving point functions? Explain.

(15 marks)

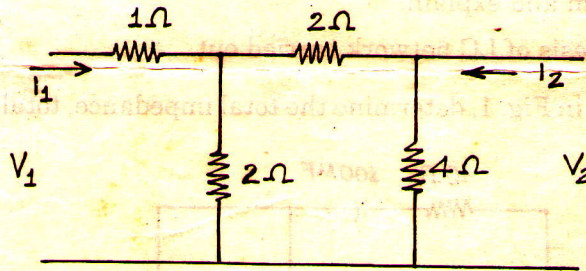
- IV. (a) Express the elements of the T network shown in Fig. 3. in terms of Z and ABCD parameters.

FIG. 3.

(15 marks)

Or

- (b) Find the Z parameters of the circuit in Fig. 4.

FIG. 4.

(15 marks)

- V. (a) Is the function $F(s) = s + \sqrt{s^2 + 1}$ positive real? Justify your answer.

(15 marks)

Or

- (b) Show that the slope of the reactance versus frequency curve for LC network approaches its minimum value when frequency approaches an infinite value.

(15 marks)