B. Tech Odd Semester Examination, February, 2023

Electronics & Communication Engineering

(3rd Semester)

Course No.: ECE-306
(Network Theory)

Full Marks: 50
Pass Marks: 25

Time: 2 hours

Note: 1. Attempt any five questions.
2. Begin each answer in a new page.
3. Answer parts of a question at a place.
4. Assume reasonable data wherever required.
5. The figures in the right margin indicate full marks for the question.
6. All the mathematical symbols and abbreviations have their usual meanings.

1.   a)i)   What areactive and passive elements in electrical components?

ii)   What are independent and dependent sources?

iii)   How maximum power can be transferred to a load?

b)   State and explain with circuit diagram Thevenin's theorem and Norton's theorem.
                                        2+2+1+2.5+2.5=10

2.   a)   What is two port networks?Find out the value of Z-Parameter with figure.

b)   What are the condition of Transmission (ABCD) parameters in case of

(i) reciprocal network

(ii) symmetrical network
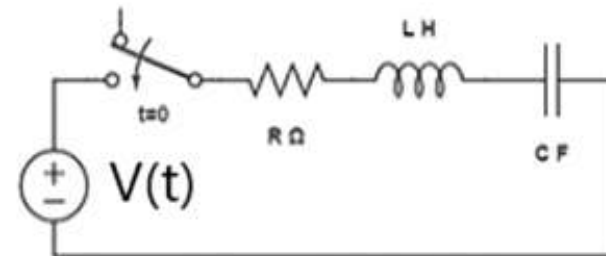
(iii) reciprocal lossless network

1+4+2+2+1=10

3. a) Explain with circuit and characteristic diagram Low Pass Filter and High Pass Filter.

b) What is Band Stop Filter?

c) Calculate the cut-off or "breakpoint" frequency (f_c) for a simple passive high pass filter consisting of an 82μF capacitor connected in series with a 240kΩ resistor. 3+3+1+3

4. a) Illustrate T- and π- Networks.

b) Design a constant –k low pass T and π section filters having cut off frequency of 4 kHz and nominal characteristic impedance of 500 ohms. What is the pass band of this filter?

2+2+5+1=10

5. a) In a series R-L-C circuit, derive the transient response V(t). Find the nature of roots in form of Laplace transform. 5
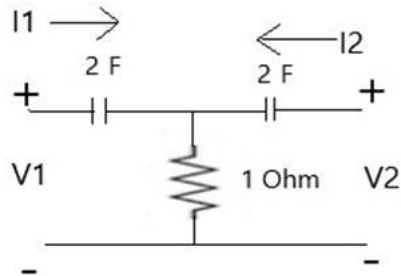
b) Find equation of current i(t) from the circuit shown below. 5
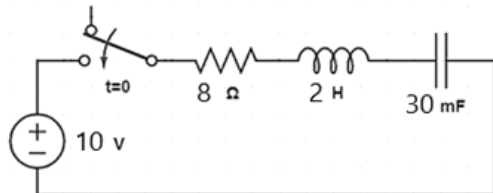
6. a) Write the characteristics of Band Pass filter? Find the transfer function of RC passive LPF with circuit diagram and also the cut off frequency(f_c) expression.

b) Illustrate the transfer function of Butterworth type low pass and high pass filter. 5+5=10

7. a) Explain characteristic impedance of a long transmission line with mathematical formula.

b) What is the value of the characteristic impedance in manual telephone instrument?

c) Find out the value of charcteristic impedance of a line consisting of Resistance 100 Kohm/ meter, Inductance 50 mH/meter, Capacitance 60 μF, Conductance 60 siemens/meter flowing 50 hertz frequency of signal. 4+1+5

8. a) What are network graph and trees?

b) What are the applications of two port networks in electrical circuit analysis?

c) Calculate ABCD parameters for the below network 3+2+5

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