Roll No.:.....

National Institute of Technology, Delhi

Name of the Examination: B. Tech.

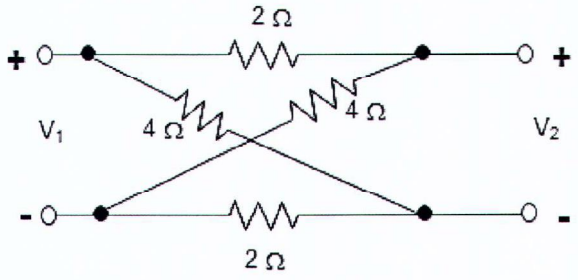
End Semester Examination (Autumn, 2019)

Branch	**: ECE and EEE**	**Semester**	**:3rd**
Title of the Course	**: Network Analysis and Synthesis**	**Course Code**	**: EEL 201**

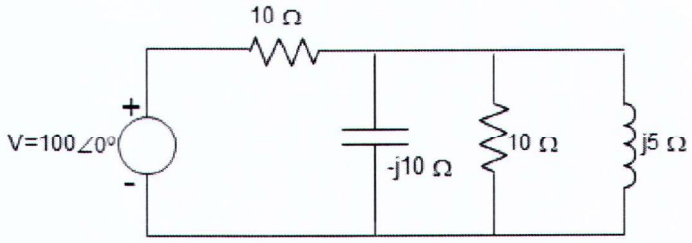
Time: 3 Hours **Maximum Marks: 50**

SECTION A: ANSWER ALL QUESTIONS

1. What are the conditions of reciprocity and symmetry for ABCD-parameters and h-parameters? **(1)**
2. The power drawn by a three-phase induction motor is measured using two wattmeter method. The readings of wattmeter W_1 and W_2 are 10 kW and 5 kW respectively. Calculate the total three-phase real power and total three-phase reactive power. **(1)**
3. Determine the Z-parameters for the following circuit. **(1)**

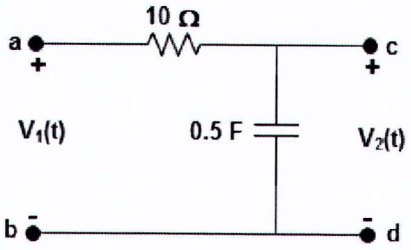


4. State Reciprocity theorem and Millman's theorem. **(1)**
5. Draw the phasor diagram for the voltage and currents in delta connection and give the relation between line current and phase current and line voltage and phase voltage. **(1)**
6. Find the active power delivered by the source in the circuit given below: **(1)**



7. What are the restrictions on the location of poles and zeros in the driving point functions? **(1)**
8. Write all the equivalent Y-parameters for two parallel connected 2-port network and draw its equivalent circuit. **(1)**

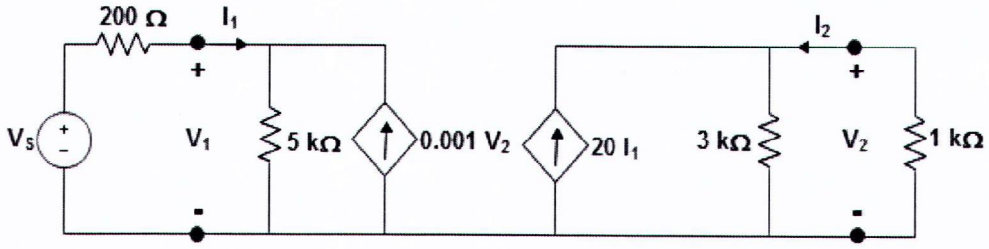
9. Obtain the transfer function of the given network: **(1)**



10. Using Routh-Hurwitz criterion, determine the rang of values of a system parameter K for which the system is stable. $F(s)=s^3+3s^2+3s+K=0$ **(1)**

SECTION B: ANSWER ANY FOUR QUESTION

11. Determine the Y parameters and Z_{out} for the terminated two port network given as follows: **(5)**

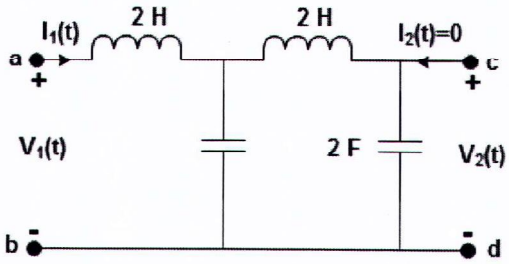


12. Check whether the following function is the positive real function or not with the proper justification.

$$F(s)=\frac{2s^2+2s+1}{s^3+2s^2+s+2}$$

(5)

13. Determine the driving point impedance, transfer impedance, transfer admittance, voltage transfer ratio and current transfer ratio for the circuit given below. **(5)**

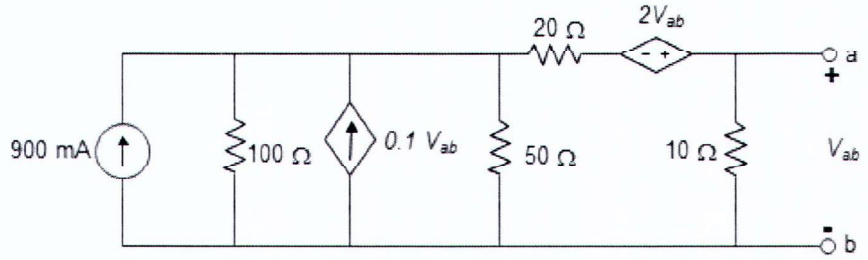


14. A balanced three phase 400 V supply is applied across the lines of a delta connected load having a parallel combination of resistance and capacitance in each phase. The resistance and capacitive reactance values are 5 Ω and –j5 Ω respectively. Determine the phase current and line current in each phase and draw the phasor diagram. **(5)**

15. Comment whether the following polynomials are Hurwitz polynomial or not with the proper justification. (a) $F(s)=s^5+3s^4+3s^3+4s^2+s+1$ (b) $F(s)=s^4+s^3+2s^2+4s+1$ **(5)**

SECTION C: ANSWER ANY TWO QUESTION

16. Determine the Thevenin and Norton equivalents of the given circuit across the terminals a and b. Also, determine the value of the resistance that would absorb maximum power from the given circuit when connected across the terminals a and b and calculate the maximum power. **(10)**



17. Show that the driving point function, $Z(s)$ can be realized in both the Cauer-I and Cauer-II forms of networks. $Z(s)=\dfrac{s(s^2+4)}{2(s^2+1)(s^2+9)}$ **(10)**

18. A three phase induction motor takes 100 kVA at 0.6 pf (lagging) from a 440 V, 50 Hz balanced three phase source. Another delta connected load which is having the series combination of resistance value of 8 Ω and reactance value of –j 24 Ω in each phase is connected to the same source. Determine the total active power, total reactive power, total VA power, line current and the power factor of the combination. **(10)**