

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
Third Semester B.Tech Degree (S,FE) Examination December 2020

Course Code: EC201

Course Name: NETWORK THEORY

Max. Marks: 100

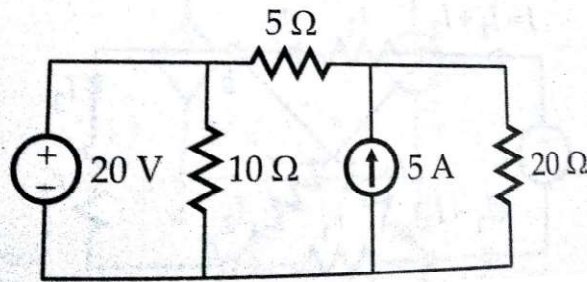
Duration: 3 Hours

PART A

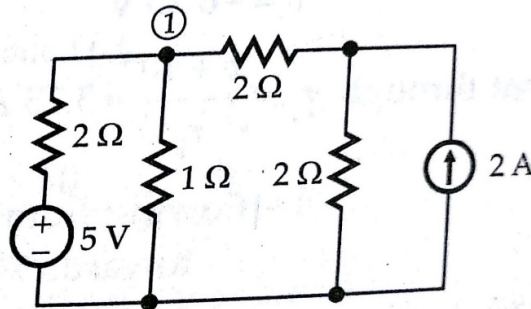
Answer any two full questions, each carries 15 marks.

Marks

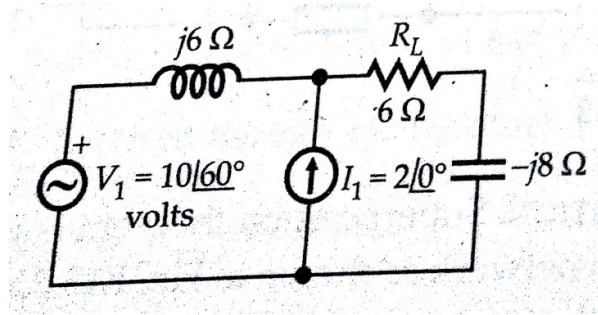
- 1 a) State and explain Thevenin's theorem and Norton's theorem. (4)
- b) Find the power loss across 5Ω for the given network by using mesh analysis. (5)



- c) Find the current in 1Ω by nodal analysis. (6)



- 2 a) Using super position theorem, find the current through 6Ω for the given network. (8)

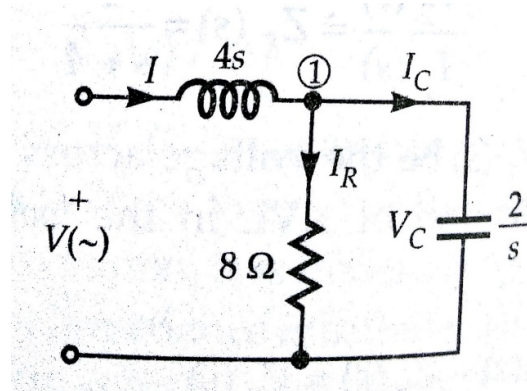


- b) Explain Complete incidence matrix and fundamental cutset matrix with an example. (7)
- 3 a) State and prove Initial value theorem. (3)
- b) Find inverse Laplace transform of $F(s) = \frac{50}{(s+1)(s+5)}$ (4)
- (c) Find the Laplace Transform of the following (8)
- (i) $\cos(\omega t + \Theta)$ and (ii) $(1 + 2t e^{-6t})^3$

PART B

Answer any two full questions, each carries 15 marks.

- 4 a) Solve the differential equation using Laplace Transform $Y'' + 2Y' + 3Y = 0$ (8)
Given $y(0) = 1$ and $y'(0) = 0$
- b) Given $I(s) = \frac{3s}{(s+1)(s+3)}$ (7)
Plot Pole zero plot and hence obtain $i(t)$ from pole zero plot.
- 5 a) Write any five properties of driving point admittance functions. (5)
- b) A series RLC circuit with $R = 300\Omega$, $L = 1$ H and $C = 100$ Micro Farad has a constant voltage of 50 V applied at $t=0$. Find maximum value of current. Assume zero initial condition. (6)
- c) A series RL circuit with $R = 200\Omega$ and $L = 20$ H is connected to a 250 V dc source. Find the transient current. (4)
- 6 a) Derive transient current and voltage responses of RL and RC Circuits energised by a dc voltage source of V volts. (10)
- b) Find Voltage Transfer function for the given network. (5)



PART C

Answer any two full questions, each carries 20 marks.

- 7 a) Find the ABCD parameters for the given network. Given $Z_{11} = 4 \Omega$, $Z_{12} = 1 \Omega$, $Z_{21} = 3 \Omega$ and $Z_{22} = 3 \Omega$ (8)
- b) Explain hybrid parameters of two port network. (7)
- c) Explain dot convention in coupled coils. (5)
- 8 a) Explain series and parallel connections of two port networks. (8)
- b) Determine the interrelationship between hybrid and Z parameters. (6)
- c) Explain the following terms (6)
- (i) Bandwidth (ii) Q- factor and (iii) Selectivity
- 9 a) Two similar coupled coils of resistance 5Ω and self inductance 1 H are in series. This is in series with a 100 Micro Farad Capacitor. A 220V, 50 Hz source energise the circuit. Draw the dotted equivalent circuit. Calculate the coefficient of coupling so that circuit behaves as a pure resistor. (8)
- b) Derive the output voltage expression for a single tuned circuit. (7)
- c) A double tuned circuit is tuned to a frequency of 750 Hz. when excited with voltage source at critical coefficient of coupling, the maximum voltage across $C_2 = 20 \text{ V}$. Find the coefficient of coupling and the source voltage. (5)
- Given $Q_1 = 6$, $Q_2 = 10$ $R_1 = 10 \Omega$ and $R_2 = 90 \Omega$
