Bharatiya Vidya Bhavan's

Sardar Patel College of Engineering

(A Government Aided Autonomous Institute)

Munshi Nagar, Andheri (West), Mumbai – 400058.

KT-Examination

June 2018

Maximum Marks: 100 Duration: 3 hour

Class: S.Y.B.Tech Semester: III Program:Electrical Engineering

Name of the Course: Engineering Mathematics III Course Code : BTE201

- Question No.1 is COMPULSORY
- Attempt any FOUR questions out of remaining SIX questions
- Answers to all sub questions should be grouped together.

Q		Marks	CO	Module No.
1(a)	Find the characteristic equation of the matrix A. $A=\begin{bmatrix}4 & 3 & -1\\ 2 & 1 & -2\\ 1 & 2 & 1\end{bmatrix}$ Hence find A^{-1}	5	4	7
(b)	Find Laplace transforms of $f(t)=\sin^3 t$	5	1	1
(c)	Obtain the Fourier Series for $f(x)=\begin{cases}0 & -2\le x\le -1\\ 1+x & -1\le x\le 0\\ 1-x & 0\le x\le 1\\ 0 & 1\le x\le 2\end{cases}$	5	2	4

(d)	Show that the function $u(x,y)=4xy-3x+2$ is harmonic. Construct the corresponding analytic function $f(z)=u(x,y)+iv(x,y)$	5	3	5
2 (a)	Find the eigen values and eigen vectors of the matrix. $\begin{bmatrix}1 & 2 & 3\\ 2 & 4 & 6\\ 3 & 6 & 9\end{bmatrix}$	6	4	7
(b)	Prove that $\int_0^\infty \frac{e^{-t}\sin^2 t}{t}dt=\frac{1}{4}\log 5$	6	1	2
(c)	Obtain the half range sine series for $f(x)=\begin{cases}\frac{2x}{3} & 0\le x\le\frac{\pi}{3}\\ \frac{\pi-x}{3} & \frac{\pi}{3}\le x\le\pi\end{cases}$	8	2	5
3 (a)	Prove that the following function is analytic f(z)=Sin(z)	6	3	5
(b)	Show that $A=\begin{bmatrix}\cos\theta & 0 & \sin\theta\\ 0 & 1 & 0\\ -\sin\theta & 0 & \cos\theta\end{bmatrix}$ is an orthogonal matrix	6	4	7
(c)	Find L $\left[\frac{d}{dt}\left(\frac{1-\cos 2t}{t}\right)\right]$	8	1	1
4 (a)	Find the Fourier series for $f(x)=\begin{cases}0 & -\pi\le x\le 0\\ x^2 & 0\le x\le\pi\end{cases}$	6	2	4
(b)	Find the Laplace transforms of f(t), where $f(t)=\begin{cases}t, 0<t<1\\ 0, t>1\end{cases}$	6	1	1
(c)	Find the analytic function $f(z)=u+iv$, given that $u-v=(x-y)(x^2+4xy+y^2)$	8	3	5
5 (a)	Evaluate: $L^{-1}\left\{\frac{2s-1}{s^3+s}\right\}$	6	1	2

(b)	Find non – singular matrices P, Q so that PAQ is a normal form where $A=\begin{bmatrix}2&1&4\\3&2&2\\7&4&10\\1&0&6\end{bmatrix}$	6	4	6
(c)	Obtain complex form of the Fourier series for $f(x)=e^{-x} \quad -\pi \le x \le \pi$	8	2	4
6(a)	Evaluate: $L^{-1}\left\{\frac{s^2+2s+3}{(s^2+2s+5)(s^2+2s+10)}\right\}$	6	1	2
(b)	For what values of λ and μ the linear equations. $x+2y+z=8$ $2x+2y+2z=13$ $3x+4y+\lambda z=\mu$ have i)No solution ii) A unique solution iii)infinite number of solutions	6	4	6
(c)	Show that the transform $w=\frac{1}{z}$ transforms circle $\lvert z-3\rvert=5$ into the circle. $\left\lvert w+\frac{3}{16}\right\rvert=\frac{5}{16}$	8	3	5
7 (a)	By using the sine series for $f(x)=1$ in$0<x<\pi$ .Hence using parseval identity show that $\frac{\pi^2}{8}=1+\frac{1}{3^2}+\frac{1}{5^2}+\frac{1}{7^2}+....$	6	2	4
(b)	Evaluate: $L^{-1}\left\{\log\left\lvert\frac{s-b}{s-a}\right\rvert\right\}$	6	1	2
(c)	Solve $y''+y=t$ Given $y(0)=1$ $y'(0)=-2$	8	1	2

S Y B.Tech. Sem III BTE 203.

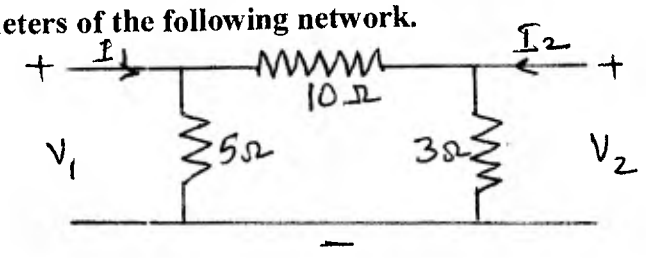
ELECTRICAL NETWORKS

Marks:100

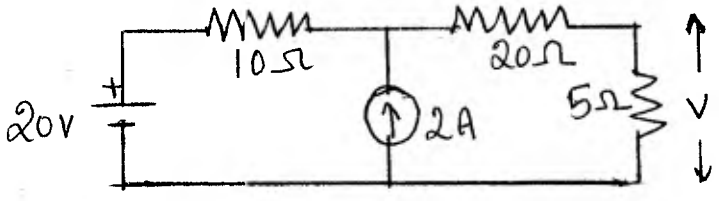
Question no 1 is compulsory
Answer any 4 questions from the remaining 6
Assume suitable data if missing

1. Answer any four **[4x5=20]**

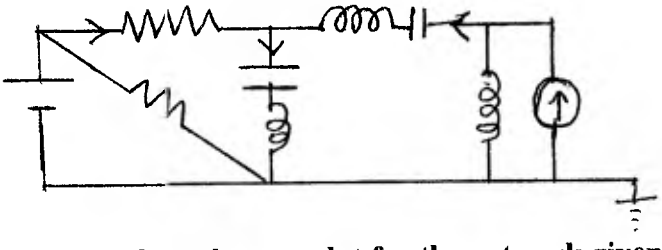
a. Find z parameters of the following network.



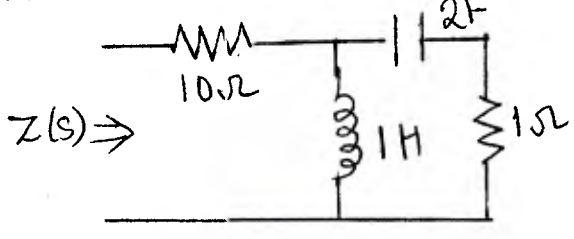
b. Find the voltage across 5 ohm resistor in the circuit shown below



c. Draw the oriented graph and obtain the incidence matrix



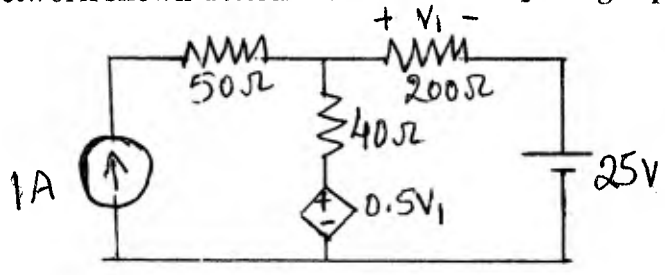
d. Find Z(S) and draw the pole zero plot for the network given below.



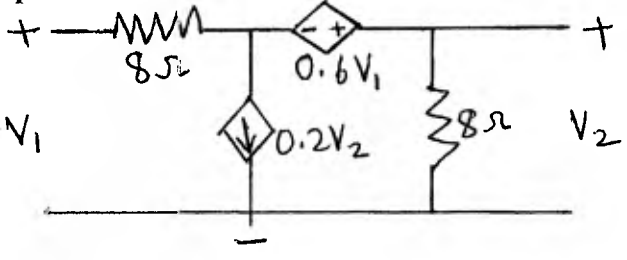
e. Synthesize the following driving point impedance function in Cauer-I form

$$z(s) = (s^2+1)/s(s^2+3)$$

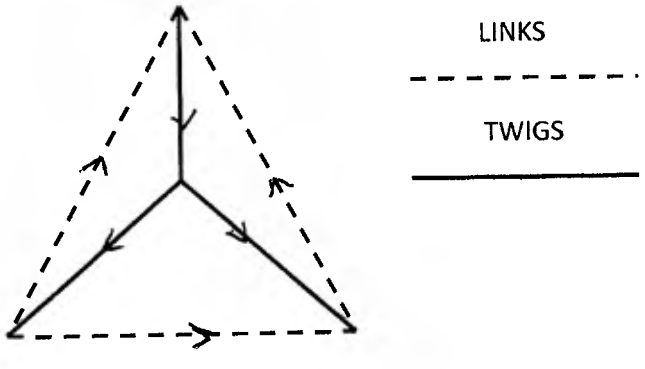
2. a. For the network shown determine the current I_2 using superposition theorem [10]



b. Determine y parameters for the following network [10]



3. a. Find the incidence matrix, tie-set matrix and f-cutest matrix for the graph given below. [10]



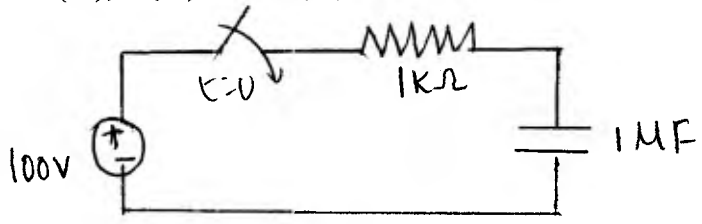
b. Test the following polynomials for Hurwitz [10]

i) $P(s) = s^4 + 7s^3 + 6s^2 + 21s + 8$

ii) $P(s) = s^4 + 3s^2 + 2$

iii) $P(s) = s^5 + s^3 + s$

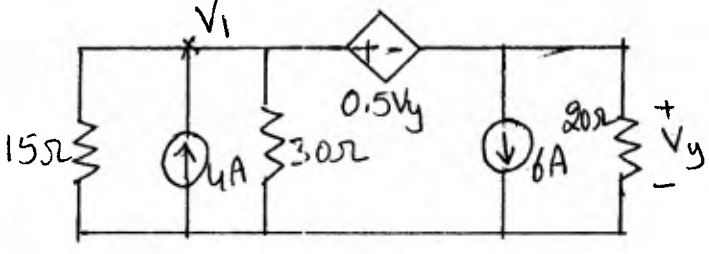
4. a. Find $i(0^+)$, $di(0^+)/dt$, $d^2i(0^+)/dt^2$ if the switch is closed at t=o [08]



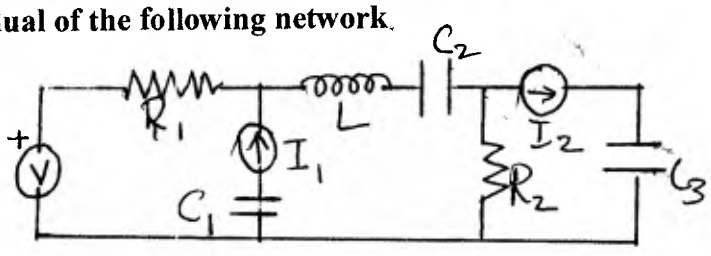
b. Realize the following driving point function in Foster-I and Foster-II forms [12]

$$z(s) = s(s+3)/(s+1)(s+5)$$

5. a. Find V_1 using nodal analysis [10] 06

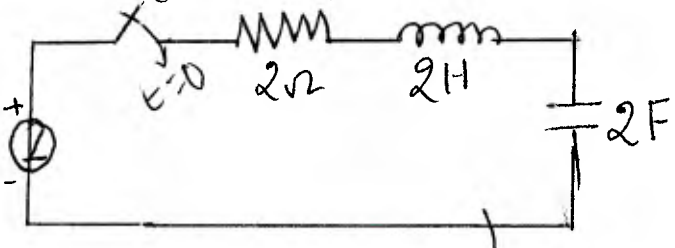


b. Draw the dual of the following network. [05] 06



c. Test whether the following function is positive real [10] 08

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

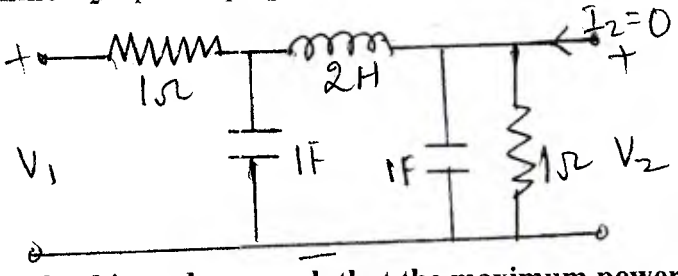


6. a. The switch is closed at t=0 Find i(t) for t > 0 using Laplace Transform. [10]
The input is a Unit ramp function

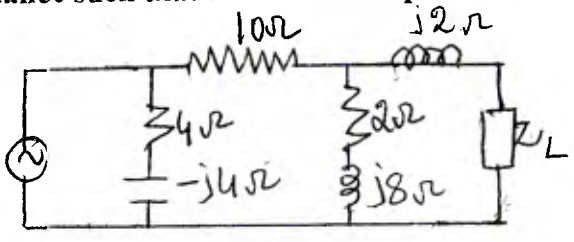
b. A series RLC circuit has R = 10 ohms, L = 60mH. At a frequency of 25 Hz the power factor of the circuit is 45° lead. At what frequency does the circuit resonate? [05]

c. In a series RLC circuit R=200Ω, L=0.1H & C=10μF check whether the circuit is under damped, critically damped or over damped. [05]

7. a. Determine V_2/V_1 and I_1/V_2 for the network shown in figure. [10]



b. Find the load impedance such that the maximum power is transferred to the load. [05]



c. Derive the expression for current and voltage across a capacitor and plot current and voltage as a function of time. [05]

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Re Examination

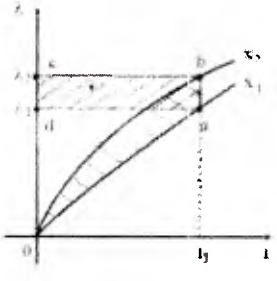
Program: Electrical Engineering | **Date: June 2018**
Duration: 3 hrs. | **Course code: BTE 205**
Maximum Marks: 100 | **Semester: III**

Course Name: Electrical Machines I

Note: Answer any **FIVE** questions out of **SEVEN**.
Assume any suitable data if necessary and justify them.

1 a) Define and state the units of following parameters: 10

i) Magnetic flux (ii) Magnetic flux density
iii) Magnetic field strength (iv) Permeability

b) 

What do you mean by electromechanical energy conversion? Fig. shows the magnetization characteristics. What does Area oabo and Area abcda represent? 10

2 a) Discuss in detail all the conditions required for successful parallel operation of two transformers. How they will share the load? 10

b) A 5 kVA, 1000/200V, 50Hz single phase transformer gave following results:

OC Test (LV side): 200V, 1.2A, 90W

SC Test (HV side): 50V, 5A, 110W

Compute the parameters of approximate equivalent circuit referred to LV side. Also calculate the efficiency at half load and 0.8 pf lagging. 10

3 a) Compare two winding transformer with autotransformer and derive the expression for copper saving in autotransformer. 10

b) A 125 kVA transformer with primary voltage of 2000V at 50Hz has 182 primary and 40 secondary turns. Neglecting losses, calculate a) full load primary and secondary currents b) no load secondary induced emf c) maximum flux in core. 10

4	a)	Explain connection and phasor diagram of Dy11 and Yy6 transformer	10
	b)	What is switching inrush current? Explain switching in phenomena of a three phase transformer	10
5	a)	Illustrate with neat sketches cogging and crawling of induction motor	10
	b)	Draw and explain the speed torque characteristics of a three phase induction motor and mark starting torque, maximum torque and full load operating point.	10
6	a)	Why a starter is required for a three phase induction motor? Explain star delta starter.	10
	b)	Explain the principle of operation of an induction generator. Where it is normally used?	10
7	a)	Discuss briefly the effects of armature reaction with neat sketches.	10
	b)	Draw and explain torque-armature current, speed-torque and speed-armature current characteristics of DC shunt and series motor.	10