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BTECH
(SEM-IV) THEORY EXAMINATION 2018-19
ELECTRICAL MACHINES AND CONTROLS

Time: 3 Hours *Total Marks: 70*

Note: 1. Attempt all Sections. If required any missing data, then choose suitably.

SECTION A

1. Attempt all questions in brief. **2 x 7 = 14**

a. What are the properties of Ideal Transformer?
b. What is transfer function? Explain Poles and Zeros of transfer function.
c. Write the rules for Block diagram reduction.
d. Write the difference between open loop and closed loop system.
e. What is Synchronous Condenser?
f. Define static and dynamic system.
g. List the feature of AC servo motor.

SECTION B

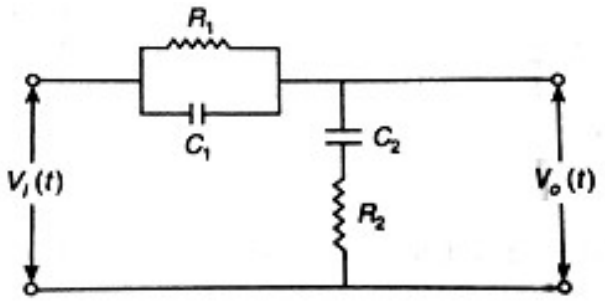
2. Attempt any *three* of the following: **7 x 3 = 21**

a. Derive equation of torque developed by 3 phase induction motor. Draw typical torque slip curve and the deduce condition for maximum torque.
b. Derive the Expression for EMF equation of transformer and list the losses in transformer.
c. Write the difference between Synchronous motor and Induction Motor.
d. Derive the Expression of Slip in 3-Phase Induction motor. What is the value at starting and at synchronous speed.
e. Discuss the PI and PD controller with their application.

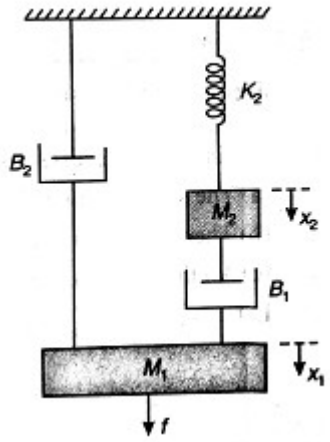
SECTION C

3. Attempt any *one* part of the following: **7 x 1 = 7**

(a) Derive the transfer function of the R-C network of a given network.



(b) Draw the free body diagram and write the differential equation of the given system shown in figure.



4. Attempt any *one* part of the following: 7 x 1 = 7

(a) A second order system is given by

$$\frac{C(s)}{R(s)} = \frac{25}{s^2+6s+25}$$

Find its rise time,peak time, peak overshoot and settling time if subjected to unit step input.Also calculate expression for its output response.

(b) Explain Single Phase Induction motor and give its two applications.

5. Attempt any *one* part of the following: 7 x 1 = 7

(a) Discuss the Speed Control methods of DC Motor.

(b) By means of Routh Stability, determine the stability of the system represented by the characteristics equation

$s^5 + 4s^4+8s^3+8s^2+7s=4=0$

6. Attempt any *one* part of the following: 7 x 1 = 7

(a) Name the various methods of Starting of poly phase induction motor and describe one method in detail.

(b) The transfer function of a unity feedback system is given by

$$G(s)= \frac{K}{S(S+4)(S+5)}$$

Sketch the root locus as K varies from zero to infinity.

7. Attempt any *one* part of the following: 7 x 1 = 7

(a) Construct the bode plot for a Unity feedback control system having transfer function

$$G(s) = \frac{1000}{S(S+1)(s+100)}$$

And determine Phase margin and Gain Margin.

(b) Draw the polar plot for

$$G(s)= \frac{6}{(S+1)(S+2)}$$

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Q5 (b): $S^5+4S^4+8S^3+8S^2+7S+4=0$