AIKTC/KRRC/SoET/ACKN/QUES/2019-20/ **Date:** 15/01/2020

School: SoET-CBSGS **Branch:** ELECT. ENGG. **SEM:** VIII

To,
Exam Controller,
AIKTC, New Panvel.

Dear Sir/Madam,

Received with thanks the following **Semester/~~Unit Test-I/Unit Test-II (Reg./ATKT)~~** question papers from your exam cell:

Sr. No.	Subject Name	Subject Code	Format		No. of Copies
			SC	HC	
1	Design, Management and Auditing of Electrical Systems	EEC801		—	—
2	Drives and Control	EEC802		✓	02
3	Power System Planning and Reliability	EEC803		—	—
4	Elective- II Flexible AC Transmission System	EEE80X		✓	02
5					
6					

Note: SC – Softcopy, HC - Hardcopy

(Shaheen Ansari)
Librarian, AIKTC

Time: 3 hours **Marks: 80**

Instructions:

- Question No: 1 is compulsory.
- Answer any three from the remaining five questions.
- Figures to the right indicate full marks.
- Answers to questions should be grouped and written together.

Q1	**a)**	What are the features of vector control	**20**
	b)	What are the components of load torque	
	c)	Prove that the energy loss during stopping by plugging is $\frac{3}{2}J\omega_{ms}^2$	
	d)	A motor of smaller rating can be selected for a short time duty. Why?	
Q2	**a)**	Draw the block diagram representation of electrical drive and discuss the function of each block.	**10**
	b)	A weight of 500 kg is being lifted up at a uniform speed of 1.5 m/s by a winch driven by a motor running at a speed of 1000 rpm. The moment of inertia of motor and winch are 0.5 and 0.3 kg-m^2 respectively. Calculate the motor torque and equivalent moment of inertia referred to the motor shaft. In the absence of weight, motor develops a torque of 100 N-m when running at 1000 rpm.	**10**
Q3	**a)**	Explain the operation of closed loop speed control scheme with inner current control loop. What are the various functions of inner current control loop	**10**
	b)	A drive has following parameters: $J = 10\ kg - m^2$, $T = 15 + 0.05N$, N-m and $T_l = 5 + 0.06N$, N-m, where N is the speed in rpm. Initially the drive is working in steady state. Now the drive is braked by electrical braking. Torque of the motor in braking is given by $T = -10 - 0.04N$, N-m. Calculate time taken by the drive to stop.	**10**
Q4	**a)**	Derive the thermal model of motor for heating and cooling	**10**
	b)	How a chopper fed DC separately excited DC motor operate in motoring and regenerative braking mode. Develop ω *vs* T relation and draw speed torque characteristics	**10**
Q5	**a)**	Describe the operation regenerative braking of an induction motor	**06**
	b)	Why Static Scherbius scheme is called slip energy recovery scheme and what are its advantages. Illustrate with relevant diagrams and derivations.	**08**
	c)	What are the reasons for using load equalization in an electrical drive?	**06**
Q6	**a)**	Describe the operation brushless DC motor	**10**
	b)	What is the basic principle of Direct torque control method? Explain with block diagram.	**06**
	c)	Derive fundamental torque equation and mention the significance of dynamic torque	**04**

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(1)

BE- sem-VIII - CBSGS - Electrical 11/12/19

(3 Hours) [Total Marks: 80]

1. **Question No.1 is Compulsory**
2. Answer any three out of remaining five questions
3. Assume any suitable data wherever necessary and justify the same
4. Illustrate answer with sketches wherever required

Q.1 Answer all questions

a) What is reactive power biasing? Explain with V-Q characteristics. 05

b) What are the objectives of voltage and phase angle regulators 05

c) Explain various parameters which limit loading capabilities of transmission line 05

d) An AC supply with an input AC line voltage of 400V at 50 Hz is connected with three-phase three-wire delta connected balanced load having ZL= (4.0+j2.0) pu and a base impedance of 5Ω per phase. It is to be realized as a unity power factor load on the AC supply system using shunt connected lossless passive elements (L and/or C) 05

i) Calculate compensator currents

ii) Calculate the values of compensator elements (in farads or Henries)

Q.2 a) Explain various types of facts controllers with their objectives in detail 10

b) Show that voltage sensitivity for load reactive power is $\frac{dv}{dq} = \frac{-E/SSC}{1+kr^{\wedge}(E/SSC)}$ 10

Q.3 a) Explain power factor correction in single phase systems 10

b) Explain switching converter type VAR generator 10

Q.4 a) Explain switching converter type series compensation (SSSC) 10

b) Explain Thyristor Controlled Phase Angle Regulator (TCPAR) 10

Q.5 a) Explain power flow and dynamic stability considerations of a transmission interconnection. 10

b) Explain phase balancing and power factor correction of unsymmetrical loads 10

Q.6 a) Use phasor diagram to illustrate functioning of UPFC as voltage regulator, line impedance compensator, phase shifter for simultaneous control of voltage, impedance and phase angle 10

b) Explain operation and characteristics of Thyristor Controlled Reactor (TCR). What is the condition to obtain Thyristor Switched Reactor (TSR) from TCR 10