AIKTC/KRRC/SoET/ACKN/QUES/2018-19/ **Date:** _____

School: SoET-CBCS **Branch:** ELECT. ENGG. **SEM:** V

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	Power System - II	EEC501		✓	02
2	Electrical Machines - III	EEC502		✓	02
3	Control System - I	EEC503		✓	02
4	Power Electronics	EEC504		✓	02
5	Communication Engg.	EEC505			
6	Renewable energy & energy storage			✓	02

Note: SC – Softcopy, HC - Hardcopy

(Shaheen Ansari)
Librarian, AIKTC

T.E - Sem - V – Choice Based – [redacted]

Paper / Subject Code: 32001 / Power System - II Electrical

Duration:- Three Hours **Total Marks : 80**

NOTE

1. Question No 1 is Compulsory.
2. Solve any three out of the remaining.
3. Figure to the right side indicates marks.
4. Assume the suitable data and mention the same if required

Q No 1 Answer the following questions

a. Discuss the role of bundle conductors in corona. [5]

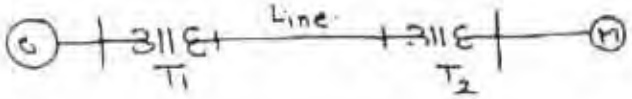
b. Explain the terms with respect to insulation level; BIL,FOW and CWW. [5]

c. Discuss the role of short circuit MVA . [5]

d. What are the various assumption in development of sequence network of power system. [5]

QNO 2a Derive an equation for maximum value of short circuit current on a transmission line. State the various assumptions made. [10]

QNO 2b A synchronous generator and synchronous motor each rated at 25 MVA and 11KV having 15 % sub transient reactance are connected through transformer and line as shown. The transformer is rated for 25 MVA 11/66 KV and 66/11 KV with leakage reactance of 10%. The line has reactance of 10% on the base of 25 MVA and 66 KV. The motor is drawing 15 MW at 0.8 pf leading and terminal voltage is 10.6KV .when symmetrical three phase fault occurs at the terminal of motor. Find the sub transient current in generator, motor and fault. [10]



QNO 3a Discuss the phase shift of symmetrical components in star delta transformer. [10]

QNO 3b A delta connected balanced resistive load is connected across an unbalanced three phase supply. where the current in line A is 10A at angle (30 degree) and current in line B is 15A at angle (-60degree). Find the symmetrical components of line currents also find the symmetrical components of delta currents. [10]

QNO 4a Derive the sequence network for one conductor and two conductor open condition from circuit conditions and symmetrical components. [10]

QNO 4b Discuss the operation of synchronous machine on No Load condition with waveform equation and equivalent circuit. [10]

QNO 5a Derive the equation for fault current and sequence network for an double line to ground fault. State the various assumptions in calculation. [10]

QNO 5b Discuss the generation of voltage and current travelling waves on an open circuited line with figure and equations. [10]

QNO 6a Calculate the voltage and current rating of an arrestor if it is placed at the end of line and at the junction of two, lines. Draw the equivalent circuit for the same. [10]

QNO 6b Discuss the generation and formation of corona ring and corona pulses in EHV lines. [10]

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(4) TE - Sem-V - Choice Based - Electrical 15/5/19

Paper / Subject Code: 32002 / Electrical Machines - III

(Time: 3 Hours) **Total Marks: 80**

NB: (1) Question **No. 1** is **compulsory**
(2) **Answer** any **THREE** questions out of the remaining **FIVE** questions
(3) Assume suitable data if **necessary** and **justify** them
(4) **Figure** to the **right** indicates **mark**

1. (a) How a rotating magnetic field is created in a 3 phase induction motor? 5
(b) What is B_{60}? State its significance. 5
(c) Draw torque-speed characteristics of three phase induction motor in braking, motoring and generating regions. 5
(d) A 3-phase , 50 Hz, 400 V, induction motor has the following parameters:- 5
$X_1 = X_2' = 0.1\ \Omega$, $R_1 = R_2' = 0.02\ \Omega$. It is to be operated at one half of its rated voltage and 25 Hz frequency. Calculate the starting torque at this condition in terms of its normal value.

2. (a) Illustrate with neat diagrams the working principle of 3 phase induction motor 10
(b) Draw the equivalent circuit of 3 phase induction motor and state the relevance of each parameter. Write the equation for the mechanical power developed. 10

3. (a) Illustrate with speed torque characteristics the V/f control of induction motor 10
(b) Illustrate working of star- delta starter with neat diagram. State its function. 10

4. (a) Illustrate double filed revolving theory of single phase induction motor and hence prove that single phase induction motor is not self starting. 10
(b) A 230 V, 50 Hz, 4 pole single phase induction motor has the following equivalent circuit parameters. 10
$R_1 = 2.4\ \Omega$, $R_2 = 4.7\ \Omega$, $X_{1m} = 3.2\ \Omega$, $X_2' = 2.8\ \Omega$, $X_M = 90\ \Omega$
Friction and windage losses = 50 W, s = 0.03 p.u.
Calculate input current, power factor, developed power, output power and efficiency..

5. (a) State the factors affecting the choice of specific electric and magnetic loadings of a 3 phase induction motor. Justify the statements. 10
(b) Write a short note on Carter's coefficient. 10

6. (a) Explain the calculation of leakage reactance for parallel sided stator slot of induction motor 10
(b) Illustrate with phasor diagram the working of capacitor start single phase induction motor. 10

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(4) TE - Sem-V - choice Based - Electrical 21/5/19

Paper / Subject Code: 32003 / Control System - 1

Time: (3 Hours) **Total Marks – 80**

N.B.:- (1) Question No.**1** is compulsory.
(2) **Attempt** any **three** questions out of remaining **five** questions.
(3) Draw neat diagrams wherever it is necessary.

Q 1. Answer any four of the following questions. **20**

A) Compare Open loop and Closed loop control system. **5**

B) Explain the following rules with suitable examples: **5**

(i) Blocks in series

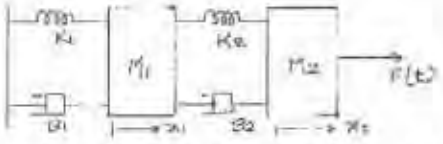
(ii) Blocks in parallel

C) Explain Routh-Hurwitz criteria of stability with suitable example. **5**

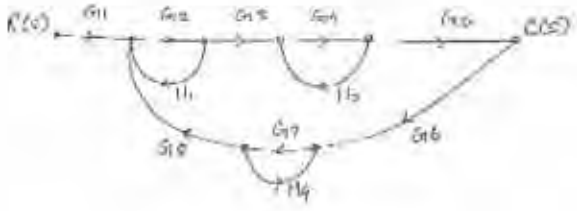
D) What are the advantages of using state space analysis over classical control approaches? **5**

E) What is Nyquist stability criteria? **5**

Q 2 a) Obtain the differential equations and transfer function describing the mechanical system shown in fig. and also draw its electric network. **10**



Q 2 b) Find the transfer function C(s)/R(s) for the signal-flow graph in figure. **10**



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Q 3 a) Write a short note on: Time response specifications. **10**

Q 3 b) The unity feedback system is characterized by an open loop transfer function $G(s) = \frac{K}{S(S+10)}$ Determine gain K, so that the system will have a damping ratio of 0.5. for this value of K, determine, T_r, T_p an M_p for a unit step. **10**

Q 4 a) Define (i) State (ii) State variables (iii) State vector (iv) State space. How to obtain the state variable form from transfer function? **10**

Q 4 b) Obtain the state representation in phase variable form of the following transfer function. $\frac{C(s)}{R(s)} = \frac{12S^2+42S+158}{S^3+10S^2+56S+158}$ Also draw state space model. **10**

Q 5 a) Sketch the root locus of a unity feedback system having $G(s)H(s) = \frac{K}{S(S+4)(S+10)}$ given, also determine the value of K for $\xi = 0.5$. **10**

Q 5 b) Explain Angle and Magnitude condition. Also explain the steps to find intersection points of root locus with imaginary axis. **10**

Q 6 a) For the unity feedback control system $G(s) = \frac{10}{S(S+1)(S+5)}$ Sketch the bode plot. Also determine GM, PM, gain and phase crossover frequencies. **10**

Q 6 b) Discuss the stability of system using Nyquist plot for $G(s)H(s) = \frac{20}{S(S+4)(S-2)}$ **10**

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(3)

TE - sem-V - Choice Based - Electrical

Paper / Subject Code: 32004 / Power Electronics

29/5/1

Duration:3hrs

Max marks:80

Note:- 1. Question No. 1 is compulsory
2. Attempt any **three** questions out of remaining **five** questions
3. Assume suitable data if necessary & justify the same.

Qu.1 Attempt **any four.**

(a) Explain V-I characteristics of an SCR [5]

(b) Compare BJT & MOSFET devices [5]

(c) Explain the working of any one single phase PWM rectifier. [5]

(d) Compare VSI & CSI [5]

(e) Draw the circuit diagram of Boost Dc to Dc convertor along with the following waveforms (i) Inductor voltage (ii) Inductor current (iii) Switch current (iv) Diode current. [5]

Qu.2 (a) Explain the switching performance of IGBT with relevant waveforms. Compare with MOSFET [10]

(b) A single phase full wave controlled bridge rectifier is operated with RL load. Draw the diagram and derive the average output voltage. What are its advantages? [10]

Qu.3 (a) What is need of snubber circuit? Explain the working of turn off snubber circuit. [10]

(b) Explain the operation of three phase bridge inverter feeding a resistive load for 120^0 conduction mode. Draw the pulse sequence for the switching & sketch all phase voltages waveforms. [10]

Qu.4 (a) In a buck boost convertor consider all components to be ideal. Let $V_d = (8 - 40\ V)$, $V_0 = 15\ V$ constant , switching frequency = 20 KHz, & C= 470 μF. Calculate the value of minimum inductance that will keep the convertor operating in CCM mode if $P \geq 2W$ [10]

(b) With neat circuit diagram explain the operation of AC voltage controller feeding RL load. [10]

Qu.5 With neat circuit diagram explain the operation of three phase fully controlled bridge converter with R load. Derive the average output voltage. Also sketch the following waveforms (i) Input voltage (ii) Output voltage for firing angle $\alpha = 60^0$ (iii) Gate triggering sequences [20]

Qu.6 (a) Explain with neat circuit diagram & waveforms the operation of step down convertor (Buck). Derive the expression of (i) Output voltage ratio (ii) Inductor current ripple (iii) Ripple in output voltage [10]

(b) Describe the operation of single phase to single phase step down cycloconverter [10]

TE - sem - V - Choice Based — Electrical

(4)

31/5/1

Paper / Subject Code: 32006 / Elective - I Renewable Energy and Energy Storage

(3 Hours) [Total Marks: 80]

N.B.

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

Q.1 a)	State and compare various renewable energy sources. What is the possibility of mitigating the problem faced due to fossil fuels with the integration of renewable energy?	05
b)	List out the solar PV technologies. Illustrate anyone in brief.	05
c)	Describe the working principle of a tidal energy power generation	05
d)	What are the different ways to use solar thermal energy? Describe any one of them in brief with the help of neat diagram.	05
Q.2 a)	Describe the principle of operation of Proton Exchange Membrane Fuel Cell (PEMFC) along with its electrical characteristics. Illustrate how PEMFC can fed power to three phase AC standalone load.	10
b)	Illustrate the financial benefits of energy storage systems in detail.	10
Q.3 a)	Explain the following technologies: i) Wave energy ii) Pumped hydro storage system	10
b)	Illustrate the concept of Maximum power point tracking (MPPT) in solar PV system? Illustrate the P&O MPPT algorithm. What precautions should be taken when using MPPT system?	10
Q.4 a)	Draw I-V (current v/s voltage) and P-V (power v/s voltage) characteristics of a solar PV cell and clearly mark all essential parameters on it. What is the impact of change in solar radiation and temperature on solar PV characteristics?	10
b)	Explain the working of a Wind Energy System (WES) with its various components. What are the different power converter topologies used for WES? Explain anyone in detail.	10
Q.5 a)	State and explain following parameters related to batteries: i) State of charge (SOC) ii) Depth of discharge (DOD) iii) Battery Capacity iv) C-Rating	10
b)	Illustrate the principle of Aerodynamics in relation with Wind turbine operation	05
c)	Illustrate the phenomenon of Hot Spots in PV module.	05
Q 6	Write short notes on: a) Solid Oxide Fuel Cell b) Distributed Generation c) Necessity of energy storage for PV system d) Electric Vehicle operation	20

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