(12) BE - Sem- VII - CBSGS - Electrical - PSOC

15/5/17

Q.P. Code :628002

3 Hours Total Marks:- **80**

Note
Question No. **1** is compulsory.
Solve any **THREE** questions out of remaining.
Assume suitable data if required and mention the same.

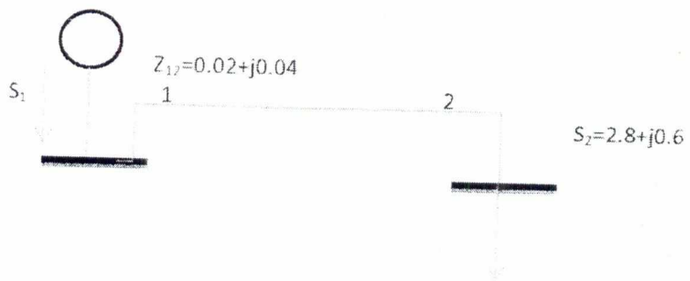
Q.1 Answer the following questions **20**
a) What are the assumptions made in FDLF?
b) Discuss the control area concept.
c) Write down the condition for Economic Load dispatch by neglecting transmission losses.
d) What is the significance of equal area criterion?

Q.2 a) Explain the dynamic response of an isolated area. How does the PI controller help to make steady state frequency of the isolated area constant for the load frequency control? **10**

b) Two generators rated 200 MW and 400 MW are operating in parallel. The droop characteristics of their governors are 3% and 4 % respectively from no load to full load. Assuming those generators are operating at 50 Hz at no load, how a load of 600MW would be shared between the two units. What will be the system frequency at this load? If load is now suddenly reduced to 400 MW what will be the new system frequency and load shared by each generator. Assume free governor operation. **10**

Q.3 a) Discuss the Newton-Raphson method for load flow study **10**

b) In two bus system shown, bus 1 is a slack bus with $V_1 = 1.0\angle 0^o$ pu and bus 2 is load bus with $S_2 = 2.8 + j0.6$ pu. The line impedance is $Z = 0.02 + j0.04$ pu **10**
a) Using Gauss Seidel method, determine V_2. Perform one iteration.
b) Determine S_1, reactive and real power loss in the line.



Q.4 a) Explain Swing equation which describes the rotor dynamics for a synchronous machine. **10**

b) A 50 Hz, 4 pole turbogenerator rated 100MVA, 11 KV has an inertia constant of 8MJ/MVA. **10**
i) Find stored kinetic energy in the rotor at synchronous speed
ii) If the mechanical input is suddenly raised to 90MW for an electrical load of 45MW, find rotor acceleration, neglecting mechanical and electrical losses
iii) What will happen in case B if mechanical input is less than the electrical load?

Q.5 a) Derive the expression for the exact co-ordination equation. 10

b) A system consists of two plants connected by a tie line and a load is located at plant 2. When 100MW are transmitted from plant 1, a loss of 10MW takes place on the tie line. Determine the generation schedule at both the plants and power received by the load when λ for the system is Rs. 25 per MWhr and the incremental fuel costs (IC) are given by the equation. 10

$IC_1 = 0.03P_1 + 17$ Rs/MWhr

$IC_2 = 0.03P_2 + 19$ Rs/MWhr

Q.6 a) Discuss the need of various compensation methods and the devices in detail. 10

b) Write short note on "Types of transactions and interchanges of energy" 10

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(5) BE - Sem-VII - CBSGS - Electrical - HVDC 19/5/15

Q.P. Code : 794701

(3 Hours) **[Total Marks : 80]**

NB: 1) Question No. **1 is compulsory.**
2) **Attempt** any **three** questions out of remaining questions.
3) **Figures** to the **right** indicate **full** marks.
4) **Assume** suitable **data if necessary.**

1. Solve any **four** :- **20**
(a) What are the limitation of AC transmission and advantages of HVDC transmission?
(b) Explain By-pass valve.
(c) Explain causes and consequences of harmonies in HVDC system.
(d) What is current margin?
(e) What is the need of DC reactor in HVDC?

2. (a) Explain the recent trends in HVDC. **10**
(b) Explain with neat diagram and waveform principle of 12-pulse converter. **10**

3. (a) Write the note an advantages and disadvantages of Ground Return. **10**
(b) Write a note on reactive power comparative in HVDC. **10**

4. (a) Explain two methods of EPC (Equidistance Pulse Control). **10**
(b) Explain different types of faults in HVDC links. **10**

5. (a) Explain commutation failure. **10**
(b) Explain converter transformer in detail also explain how different it is from normal power transformer. **10**

6. (a) Explain power reversal in HVDC and significance of current margin. **10**
(b) Explain with neat diagram different types of HVDC lines. **10**

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(5) BE-sem-VII - CBSGS- Electrical 25/5/17

T4727 / T1289 ELECTRICAL MACHINE DESIGN

Q.P. Code : 794801

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

N.B. : (1) **Question no.1** is compulsory.
(2) Solve any three out of remaining.
(3) Assume the suitable data in required and mention the same.

1. Answer the following :- **20**

a. What is the significance of Carters Coefficient?
b. What are the design modifications in stator of energy efficient more as compared to standard motor.
c. Why the various mechanical forces are developed in the winding of transformer.
d. Discuss the significance of various "Electrical Properties" of transformer oil.

2. a. Discuss the various factors affecting the choice of flux density and current density in transformer design. **10**

2. b. Calculate the overall dimensions of a 200 KVA, 6600/440V, 50 Hz, 3 phase core type transformer with data, emf per turn = 10V, maximum flux density= 1.3 Wb/m^2, current density = 2.5 A/mm^2, window space factor = 0.3, overall height = overall width, stacking factor = 0.9.Use three step core. **10**

3. a. A 15000 KVA; 50 HZ; 33/6.6 KV; 3 phase star delta; core type of transformer has following data net iron area of each limb = 1.5* 10^{-3} m^2; neat area of yoke = 1.8* 10-3 m^2; mean length of flux path in each limb = 2.3m; mean length of flux path in each yoke =1.6m; no of turns in HV = 450. calculate the no load current. Use the data provided. Dencity of iron=7.8×10^3Kg/m^3. **10**

BmWb/m2	0.9	1.0	1.2	1.3	1.4
MmfNm	130	210	420	660	1300
Iron Loss W/Kg	0.8	1.3	1.9	2.4	2.9

3. b. Derive the output equation for a three phase transformer and specify the various terms used. **10**

4. a. What are the different circuits and parts of electrical machines. Discuss the various limitations on the design of these circuits. **10**

Q.P. Code : 794801

4. b. Discuss the designing of end rings in three phase squirrel cage induction machine. How it affects the slip of machine. 10

5. a. What is frame and frame size in case of induction motor. Draw a figure showing structural dimensions of standard frame. 10

5. b. Discuss the No Load Current calculation procedure in three phase induction motor design. 10

6. a. Derive the output equation for a three phase induction motor and specify the various terms used. 10

6. b. Determine the main dimensions, turns per phase, no of slots, conductor cross section, and area of a slot, for a 250 HP, 400V, 3 phase, 4 pole, 50Hz, 1410rpm, delta connected squirrel cage induction motor with the data, average flux density in air gap = 0.5 Wb/m^2, ampere conductor per meter=30,000A/m, efficiency = 0.9, power factor = 0.9, winding factor = 0.955, current density = 3.5A/mm^2, slot space factor = 0.4, ratio of length of core to pole pitch = 1.2, assume 5 slots per pole per phase. 10

15

01/06/17

QP CODE : 810901

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

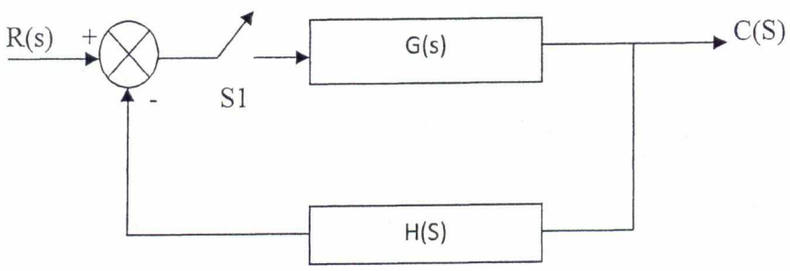
N.B 1) Question No 1 is Compulsory.
2) Attempt any three questions from the remaining.
3) Make any suitable assumption whenever required.
4) Figure to the right indicates full marks.

Q1) Solve any four questions. [04*05]

A) Explain the start & stop interlocking circuit.
B) Derive the expression for transfer function of lead compensator & draw pole-zero plot in s-plane.
C) Explain the concept of observability.
D) What do you mean by "Tustin Transformation ". Why it is used?
E) Explain the reverse acting controller.

Q2)

A) Design a Lag compensator for a unity feedback system with forward transfer function $G(s) = \frac{K}{S(S+1)(0.5S+1)}$ to meet the following specification , $\emptyset_M = 40°, G_M = 10db$ & $K_V = 5sec^{-1}$. [15]
B) Find the Z-transform of the system shown in figure, [05]



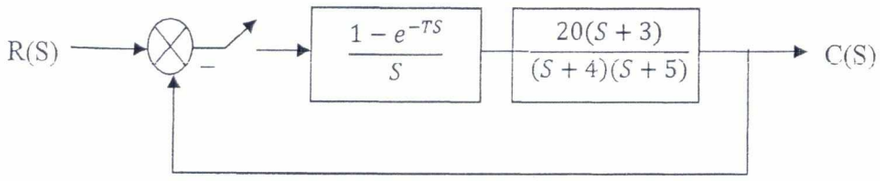
Q3)

A) Design a controller via transformation method for the system $\frac{C(s)}{R(s)} = \frac{24}{(S+2)(S+3)(S+4)}$ represented in parallel form to yield transient response describe by 20% O.S. & settling time of 4 seconds. [15]
B) Develop a flowchart for a digital compensator define by $G_{C(z)} = \frac{X(z)}{E(z)} = \frac{Z+0.5}{z^2-0.5Z+0.7}$ [05]

TURN OVER

Q4)

A) For the step, ramp & parabolic input ,find the steady state error for the unity feedback control system shown in figure, with sampling time interval "T=0.1 Seconds". [10]



B) Explain the integral windup effect & Anti windup circuit. [10]

Q5)

A) Develop a PLC ladder diagram to manufacture a inductor of 5 mH & 10 mH. When 5 mH inductor is produced a machine makes 400 revolutions to wind the coil. When 10 mH inductor is produced a machine makes 800 revolutions to wind the coil. [10]

B) Explain the implementation of digital compensator. [10]

Q6)

A) Develop a PLC ladder diagram to run the DC motor in forward/reverse direction. If forward or reverse push button is pressed motor has to run either in forward or reverse direction respectively after a delay of 25 seconds. Also provide protection for sudden change in direction of DC motor. [10]

B) Explain the different input & output field devices of PLC. [10]

(B)

BE - Sem - VII - Electrical - CBSGS

7/6/17

QP Code :811000

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

N. B. : (1) Question No.**1** is **compulsory**.
(2) Attempt any **three** questions out of remaining questions.
(3) **Figures** to the **right** indicate **full** marks.
(4) **Assume** suitable **data** if **necessary**.

1. Attempt any **four** :- **20**
   (a) What is Partial discharge? Differentiate between internal and external partial discharges.
   (b) What is non-destructive testing of insulating materials? State briefly the characteristics of these methods.
   (c) Explain the phenomenon of' treeing' in solid insulating materials under electrical Stress.
   (d) With a neat sketch explain Hall Generators for measurement of high currents.
   (e) Describe in brief the charge simulation method for estimation of Electric Field Intensity.

2. (a) What is 'Cascaded Transformer'? Explain why cascading is necessary? With neat diagram, explain a three stage Cascaded transformer system. **10**
   (b) With a neat sketch, explain the working of a Van-De-Graff generator. What are the factors that limit the maximum output voltage obtained **10**

3. (a) Define Townsend's first and second ionization constant. How the condition for breakdown is obtained in a Townsend's discharge? **10**
   (b) Describe in brief various tests carried out on 'Bushings'. **10**

4. (a) Explain how a sphere gap can be used to measure the peak value of voltages. What are the parameters and factors that influence such voltage measurement? **10**
   (b) A ten stage cock-croft Walton circuit has all capacitors of 0.06 μF each. The maximum value of secondary voltage of the supply transformer is 100 KV at a frequency of 150Hz. If the load current is 1mA, determine i) voltage regulation ii) percentage ripple iii) optimum no. of stages for max. output voltage iv) Max. output voltage. **10**

[TURN OVER

5. (a) Explain the various theories that explain breakdown in commercial liquid dielectrics. **10**

   (b) What are the various factors to be considered while designing a High Voltage Laboratory ? **10**

6. (a) Describe the construction, principle of operation and application of 3-stage Marx generator circuit. **10**

   (b) Explain the process of Electromechanical breakdown in solid dielectrics and hence derive the condition for highest apparent electric stress before breakdown. **10**
