72

BE - sem - VII - Electrical - CBSGS - PSO&C

22/11/17

Q.P. Code :22962

Duration: 3 Hours **Total Marks: 80**

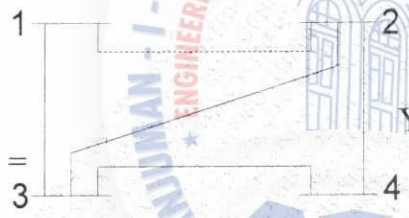
Note: 1. **Q. 1** is **compulsory.**
2. Solve any **3** questions out of remaining questions.
3. Assume suitable data if necessary.

Q.1 [20]

a. What are the assumptions made in transient stability studies?
b. What is an equal area criterion?
c. What are the assumptions made in Fast decoupled load flow studies?
d. Draw and explain heat rate curve and input output curve.

Q2

a. For the system of figure the generators are connected at all the four buses while loads are at buses 2 and 3. Values of real and reactive powers are listed in table given below. All buses other than the slack are PQ type. Assuming a flat voltage start, find the voltages and bus angles at the three buses at the end of the first GS iteration. [10]



Y BUS

3-j9	-2+j6	-1+j3	0
-2+j6	3.666-j11	-0.666+j2	-1+j3
-1+j3	-0.666+j2	3.666-j11	-2+j6
0	-1+j3	-2+j6	3-j9

BUS	P pu	Q pu	V pu
1	-	-	1.04 < 0°
2	0.5	-0.2	-
3	-0.1	0.5	-
4	0.3	-0.1	-

b. Derive the swing equation for a synchronous machine that describes the rotor dynamics. [10]

Q3

a. Explain formation of Y bus by singular transformation. [10]

b. The incremental fuel costs for 2 units of a plant are
$dF_1/dP_1 = 0.01P_1 + 11$
$dD_2/dP_2 = 0.012P_2 + 8$
Find saving in Rs/hr. for economical distribution of load compared with equal load sharing when total output is 750 MW. [10]

Q4

a. Derive the expression for the exact coordination equation. [10]

b. Explain dynamic response of load frequency controller with and without integral control action. [10]

Q5

a. A 60Hz generator is delivering 50% of maximum permissible power through a transmission system to an infinite bus. A fault occurs and causes transfer reactance to increase to 400 % of the value before fault. When the fault is isolated and the maximum power transfer is 75% of the original maximum value. Determine the critical clearing angle using equal area criterion. [10]

b. Explain the load frequency control by turbine speed governing system and derive the speed governing model. [10]

Q. 6 Write short notes on [20]
a. Power pool and transactions
b. Optimal Unit commitment and reliability considerations.
c. P-V curve for voltage stability analysis

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(42) B.E - Electrical - Sem-VII - CBSGS - HVDCT 28/11/17

Q.P. Code : 25944

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

N.B. : (1) **Question No.1** is **compulsory**.
(2) Attempt **any three** from remaining.
(3) **Figures** to the **right** indicate **full marks**.

1. Solve **any four** : **20**
   (a) Draw the different types of HVDC links.
   (b) Give classification of HVDCT.
   (c) What is the necessity of DC reactor in HVDC.
   (d) Explain the importance of current margin.
   (e) State the causes and consequences of harmonics in HVDCT.

2. (a) Explain with neat diagram & waveform 12 pulse converter. **10**
   (b) Explain single commutation with neat diagram and waveform. **10**

3. (a) Discuss desired features of control of HVDCT and explain basic control characteristic. **10**
   (b) Explain two methods of IPC (Individual Phase Control). **10**

4. (a) Write a note on advantages and disadvantages of ground return. **10**
   (b) Explain overvoltage and overcurrent protection of HVDCT. **10**

5. (a) Write the note on harmonies and filter in HVDCT. **10**
   (b) Justify the statement "Converter Consume Reactive Power". **10**

6. (a) Explain hierarchical control of HVDCT system. **10**
   (b) Explain any two methods of EPC (Equidistance Pulse Control). **10**

BE-ELECTRICAL-VII-CBSGS-EMD 05-12-17

(73)

Q.P. Code: 25420

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.

Q1. Answer the following questions.

a. What are the fundamental requirements of high electrical conductivity materials? **[5]**
b. Define Dispersion Coefficient? Explain effect of it on maximum power factor. **[5]**
c. What are the different types of enclosures used in three phase Induction Motor? State the purpose **[5]**
d. Discuss the factors affecting the choice of flux density for designing of transformer. **[5]**

Q2. a. Explain the design of insulation in transformer. **[10]**

Q2. b. Derive an output equation of single phase and three phase transformer. **[10]**

Q3. a. Discuss designing of cooling tubes and tank in a transformer. **[10]**

Q3 b. Estimate the main core dimensions for a 50Hz, 3-ph, 200 KVA, 6600/500 volts, star/delta core type transformer. Use the following data: core limb section to be 4-stepped for which the area factor (Ai) = $0.62d^2$; Window space factor = 0.27, Height of window = 2 times width of window, Current density = 2.8 A/mm^2, Voltage per turn = 8.5V, Maximum flux density = 1.25 Wb/m^2. **[10]**

Q4.a. Discuss the various mechanical forces developed in transformer with sketches. Explain how they are taken care while fabrication. **[10]**

Q4. b. Calculate the no load current of a 400V, 50 Hz single phase core type transformer, the particulars of which are as follows, length of mean magnetic path 200cm; gross core section area 100 cm^2 ; joints equivalent to 0.1mm air gap; maximum flux density 0.7 Wb/m^2; specific core loss at 50Hz and 0.7 Wb/m^2 is 0.5 watts per Kg; ampere turns 2.2 per cm for 0.7 Wb/m^2; stacking factor 0.9; density of core material 7.5×10^3 kg/m^3 **[10]**

Q5.a. Derive the output equation of a three phase Induction Motor in terms of main dimensions. **[10]**

Q5 b. Calculate 1] diameter 2] length 3] number of turns per phase 4] full load current and cross-section of conductor, and 5]total I^2R loss of stator of 3 phase, 120 KW, 2200 volts, 50 Hz, 750 rpm (synchronous speed), star connected induction motor from the following particulars; Bav = 0.48Wb/m^2 , ac = 26000 Amp conductor per meter, efficiency=92%, pf =0.88, L=1.25τ, winding factor 0.955, current density = 5A/mm^2, mean length of stator conductors =75cm, ρ= 0.021 ohm per m and mm^2 section. **[10]**

Q6 a. Discuss the Concept of Carters Coefficient in detail. **[10]**

Q6 b. Explain various types of leakage fluxes in Induction Motor with neat diagram. **[10]**

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B.E. sem-VII - CBSGS - Electrical - C.S-II 12/12/17

QP CODE : 27293

(3 Hours) Marks : 80

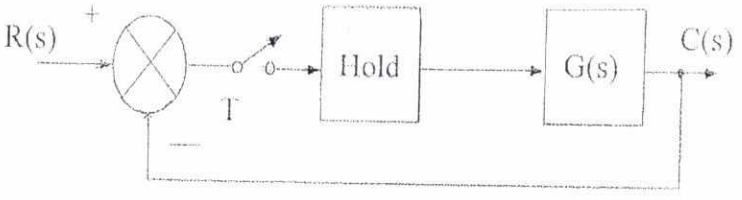
NB : (1) Question **No.1** is **Compulsory.**
(2) Attempt any three questions from remainning.
(3) Assume suitable data (mention the same) and use semi log papers wherever necessary.
(4) **Figures** to the **right** indicate full **marks**.

1. Attempt **any four** of the following:
   (a) Explain what you mean by compensator. Explain lag and lead compensator with the help of electrical network and pole - zero plot. 5
   (b) Explain issues in implementing the industrial PID controller. 5
   (c) Briefly describe the configuration of an observer. 5
   (d) Explain PLC Program execution along with steps in processor scan cycle. 5
   (e) Explain the start and stop interlocking circuit in PLC programming with the help of example. 5

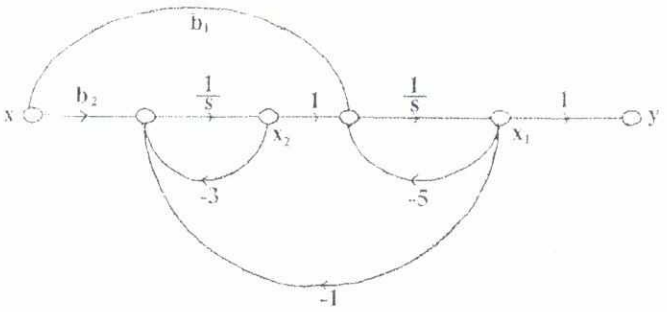
2. (a) Design a lead compensator for the unity feedback system with $G(s) = \frac{100K}{s(s+36)(s+100)}$ to yield 20% peak overshoot and velocity error constant of 40 with a peak time of 0.1 second. 10

   (b) For the plant $G(s) = \frac{100(s+10)}{s(s+3)(s+12)}$ design the phase-variable feedback gains to yield dominant pole pairs at $-10 \pm j\,10.475$ 10

3. (a) For unit step, ramp and parabolic inputs, find the stedy state error for the digital control system shown below : $G1(s) = \frac{10}{s(s+1)}$ Sampling interval $T = 0.1$ 10



(b) Given the plant shown in figure, what relationship exists between b1 and b2 to make the system uncontrollable. 5



(c) Explain the proportional band (PB). What is the proportional band setting in a hydraulic process where the controller input variable, *e(t)* was a mechanical displacement of range e_R = 1cm, and the effective controller ouput, *u(t)* was a pressure of range uR = 2 bar. At a given setting of the controller, 0.1 cm of change in *e(t)* caused 0.5 bar change in control output, *u(t)*. 5

4. (a) Design an integral controller for the plant which is represented in phase-variable form $G(s)=\frac{1}{s^2+5s+3}$ to yield a step response with 10% overshoots, a settling time of 0.5 second and zero steady state error. 10

(b) Find the closed loop digital transfer function of unity feedback system having transfer function $G_1(s)=\frac{27K}{s(s+27)}$ connected in cascade with z.O.H. circuit. Also find whether the system is stable or not for K=20 and K=100 respectively. [T = 0.2] 10

5. (a) Explain the modeling of digital computer in detail 10

(b) Explain in detail timer instructions of PLC. 10

6. (a) Draw and explain the PLC ladder diagram for manufacturing of 5 mH and 10 mH inductor coils. When a 5 mH inductor is produced: the machine makes 400 revolutions to wind the coil. If the 10 mH inductor is produced, the machine makes 800 revolutions before stopping. 10

(b) Explain AC input module of PLC. 5

(c) Explain AND, OR, NOT, NAND and NOR relay ladder logic circuits operation. 5

(12) B.E - sem - VII - Electrical - CBSGS - HVE 18/12/1

Q.P. Code: 25769

Duration: 3 Hrs **Total Marks :80**

N.B.:

- Question No. 1 is compulsory.
- Answer **any three** from the remaining five questions.
- Assume suitable data if necessary and justify the same.
- Figures to the right indicate the marks.
- Each question is for 20 marks.

Q.1 a)	Discuss the various factors which affects the breakdown of gases	(10)
b)	Explain in detail "Avalanche Theory" for the electrical breakdown in gaseous? Discuss how this theory leads to Townsend's mechanism of spark breakdown. State factors which control this process.	(10)
Q.2 a)	What is Thermal breakdown on solid dielectric? How is it practically more significant than other mechanisms?	(10)
b)	With neat diagram, explain the basic Principle of VAN-DE Graff's generator.	(10)
Q.3 a)	Explain with reference to conduction and breakdown in commercial liquids. 1. Suspended Particle Mechanism. 2. Cavitation and Bubble Mechanism.	(10)
b)	Why is Cock – Croft - Walton circuit preferred for voltage multiplier circuits? Explain its working with a schematic diagram.	(10)
Q.4 a)	Explain Marx Impulse generator circuit, 1. Circuit diagram 2. Construction 3. Principle of operation 4. Applications	(10)
b)	With a neat circuit diagram, explain the principle of operation of an "Electrostatic Voltmeter". Discuss its advantages and limitations for high voltage measurements.	(10)
Q5. a)	Explain different types of rectifier circuits for producing high DC voltage with suitable waveforms.	(10)
b)	What is partial discharge? Discuss the process of Partial Discharge (PD) in solid dielectrics and its effects on the breakdown strength of the dielectrics. Is the process of degradation of solid dielectrics reversible? Why?	(10)
Q.6 a)	What is cascaded transformer? Explain why cascading is done? With neat circuit diagram, describe a 3 – stage cascaded transformer for the generation of high A.C. voltages.	(10)
b)	Explain what is an operating duty cycle test on a Surge Diverter? Why is it more significant than other tests?	(10)