CBCS SCHEME

USN | | | | | | | | | | **15EE61**

Sixth Semester B.E. Degree Examination, June/July 2019
Control Systems

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. What is control system? Compare open loop with closed loop control systems. **(04 Marks)**

b. For the mechanical system shown in Fig.Q.1(b). Draw the mechanical network and obtain the f-v analogous electrical systems. **(07 Marks)**

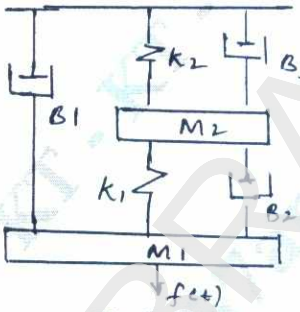

Fig.Q.1(b)

c. Explain the A.C. servo motor. **(05 Marks)**

OR

2 a. Obtain the transfer function of electrical system shown in Fig.Q.2(a). **(05 Marks)**

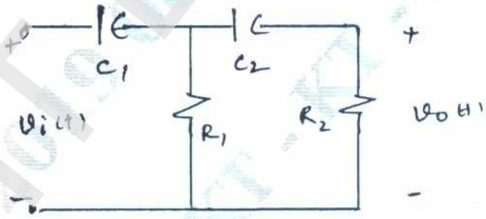

Fig.Q.2(a)

b. Explain the synchros as on error detector. **(04 Marks)**

c. For the mechanical network shown in Fig.Q.2(c), draw the F-i analogous electrical system. **(07 Marks)**

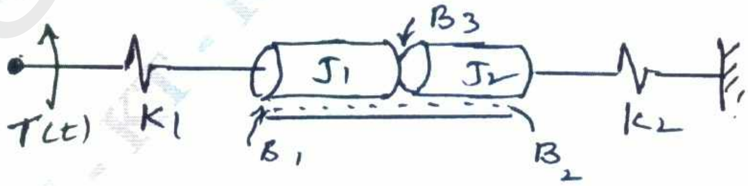

Fig.Q.2(c)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-2

3 a. What is transfer function? List the limitations of transfer function. **(04 Marks)**

b. For the block diagram shown in Fig.Q.3(b). Determine overall transfer function. **(06 Marks)**

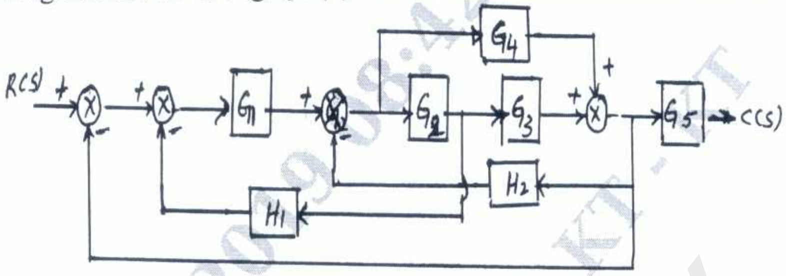

Fig.Q.3(b)

c. Determine transfer function $X_6(S)/X_1(S)$ using Mason's gain formula for the signal flow graph shown in Fig.Q3(c). **(06 Marks)**

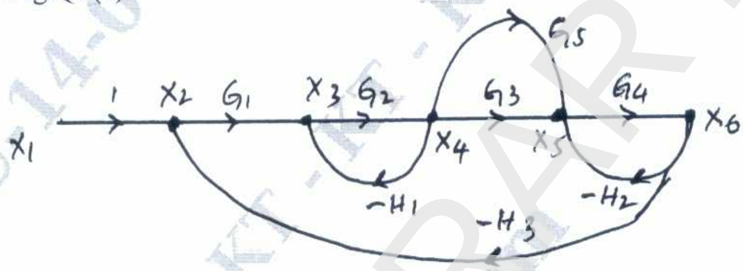

Fig.Q3(c)

OR

4 a. Define:

i) Source and sink node

ii) Loop and forward path

iii) Error signal and primary feed back signal. **(06 Marks)**

b. For the block diagram shown in Fig.Q.4(b) obtain the overall transfer functions. Draw the signal flow graph and verify the transfer functions using Mason's gain formula. **(10 Marks)**

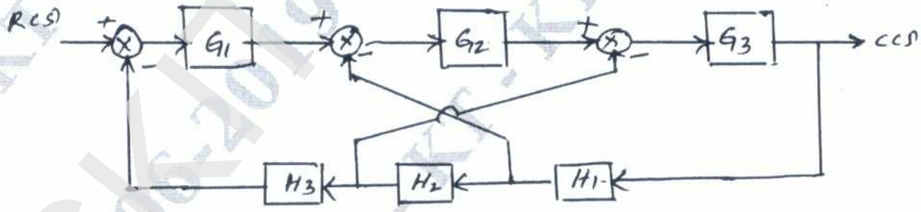

Fig.Q.4(b)

Module-3

5 a. Derive an expression for response of second order under damped system for unit step input. **(06 Marks)**

b. An unity FBCS has $G(S) = \dfrac{20(s+1)}{s(s^3 6s^2 + 8s)}$ calculate steady state error when the input $r(t) = 40 + 2t + 5t^2$. **(05 Marks)**

c. Check the stability of the give characteristic equation using R-H criterion $s^6 + 2s^5 + 8s^4 + 12s^3 + 20s^2 + 16s + 16 = 0$. **(05 Marks)**

OR

6 a. State R-H Criterion. Explain the difficulties of R-H criterion and remedy. **(06 Marks)**

b. A unity FBCS has $G(S) = \frac{K(s+13)}{s(s+5)(s+7)}$. Using R-H criterion, calculate the range of 'K' for which the system is stable. **(05 Marks)**

c. A second order system is given by $\frac{C(s)}{R(s)} = \frac{25}{s^2+6s+25}$. Find Rise time, peak time, peak overshoot and settling time for 2% tolerance. **(05 Marks)**

Module-4

7 a. Sketch the root locus for unity FBCS having $G(s) = \frac{K(s+1)}{S(s+2)(s^2+2s+2)}$. Mark the salient points. **(12 Marks)**

b. Derive an expression for resonant peak M_r and resonant frequency W_r for a standard second order system. **(04 Marks)**

OR

8 a. A unity FBCS with $G(s) = \frac{10(s+10)}{s(s+2)(s+5)}$. Find gain and phase Margin using bode plot. **(12 Marks)**

b. Write note on: i) Break away point ii) Asymptotes. **(04 Marks)**

Module-5

9 a. Explain the Nyquist stability criterion. **(06 Marks)**

b. What are the steps to design lead compensator? **(05 Marks)**

c. Explain the P-I controller on a second order systems. **(05 Marks)**

OR

10 a. Sketch the Nyquist plot for the system with $G(s)H(s) = \frac{4s+1}{s^2(s+1)(2s+1)}$ comment on stability. **(10 Marks)**

b. What is Lead-Lag compensation? Explain the procedure to design lead-lag compensation in frequency domain. **(06 Marks)**

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USN | | | | | | | | | | | **15EE62**

Sixth Semester B.E. Degree Examination, June/July 2019
Power System Analysis – I

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Show that per unit impedance of two winding transformer will remain same referred to primary as well as secondary. **(06 Marks)**

b. A 300 MVA, 20 KV, 3-phase generator has subtransient reactance of 20%. The generator supplies two synchronous motors through a 64 KVA transmission line having transformers at both ends as shown in Fig.Q1(b). T_1 is a 3-phase transformer and T_2 is composed of 3-single phase transformers of rating 100 MVA each, 127/13.2 KV, 10% reactance, series reactance of transmission line is 0.5 ohm/km. Draw the reactance diagram with all reactances marked in per unit. Select generator rating on base values.

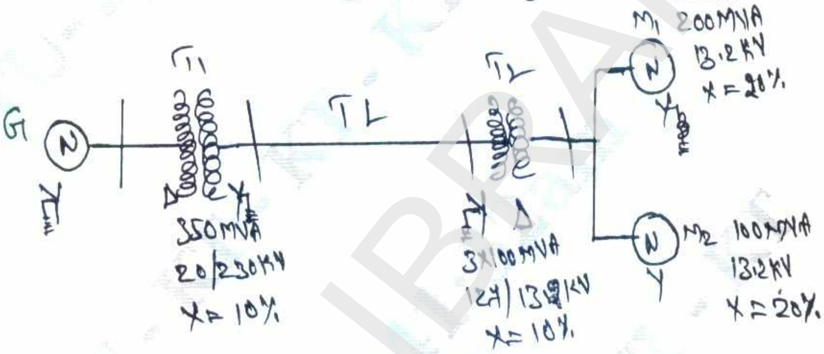

Fig.Q1(b) **(10 Marks)**

OR

2 a. Define per unit quantity. Mention the advantages of per unit system. **(04 Marks)**

b. The one line diagram of an unloaded generator is shown in Fig.Q2(b). Draw the PU reactance diagram. Choose a base of 50 MVA, 13.8 KV in the circuit of generator G_1. The ratings are as follows:

G_1 : 20 MVA, 13.8 KV, X″ = 20% T_1 : 25 MVA, 13.8/220 KV, X = 10%
G_2 : 30 MVA, 18 KV, X″ = 20% T_2 : 30 MVA, 220/18 KV, X = 10%
G_3 : 30 MVA, 20 KV, X″ = 20% T_3 : 35 MVA, 220/22 KV, X = 10%

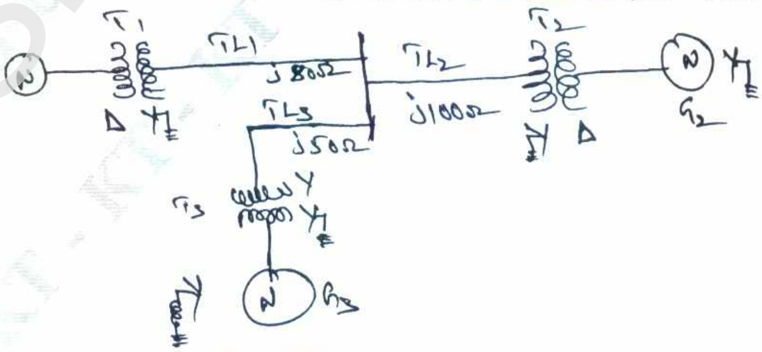

Fig.Q2(b) **(12 Marks)**

Module-2

3 a. With the help of waveform at the time of three phase symmetrical fault, on synchronous generator define steady state, transient and subtransient reactances. **(08 Marks)**

b. A generator is connected to a synchronous motor through transformer. Reduced to a common base, the per unit subtransient reactances of generator and motor are 0.15 and 0.35 PU respectively. The leakage reactance of the transformer is 0.1 PU. A 3-phase star circuit fault occurs at terminals of the motor when terminal voltage of generator is 0.9 P.U and output current of generator is 1 P.U at 0.8 pf leading. Find the subtransient current in the fault, generator and motor.

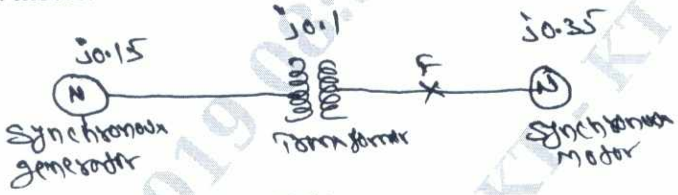

Fig.Q3(b) **(08 Marks)**

OR

4 a. Explain clearly, how circuit breaker are rated? **(06 Marks)**

b. A synchronous generator and motor are rated 30 MVA, 13.2 KV, both have subtransient reactance of 20%. The line connecting them has a reactance of 20%, on the base of machine rating. The motor is drawing 20 MW at 0.8 pf (lead). The terminal voltage of motor is 12.8 KV, when a symmetrical fault occurs at motor terminals, find subtransient current in generator, motor and at the point of fault? **(10 Marks)**

Module-3

5 a. Obtain the relationship between line and phase sequence components of voltages in star connection. Give the relevant phasor diagrams. **(08 Marks)**

b. Draw the positive, negative and zero sequence network for the power system shown in Fig.Q5(b). Choose a base of 50 MVA, 220 KV in the 50Ω transmission lines and marks all reactances in PU. The ratings of the generator and transformers are:

G_1: 25 MVA, 11 KV, $X'' = 20\%$; G_2 : 25 MVA, 11 KV, $X'' = 20\%$

3ϕ transformers (each) : 20 MVA, 11/220 KV, X = 15%

The negative sequence reactance of each synchronous machine is equal to the sub-transient reactance. The zero sequence reactance of a each machine is 8%. Assume that the zero sequence reactances of lines are 250% of their positive sequence reactances.

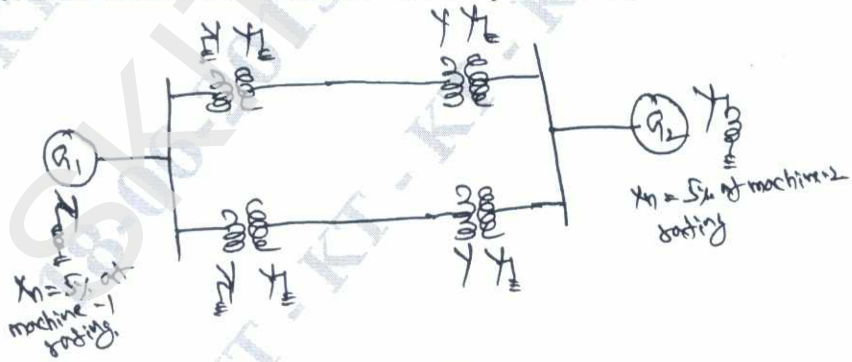

Fig.Q5(b) **(08 Marks)**

OR

6 a. Draw the zero sequence impedance networks of a transformer for the following connections:

i)  ii)  iii) 

(06 Marks)

b. The positive, negative and zero sequence components of line currents are $20\angle 10^\circ$, $6\angle 60^\circ$ and $3\angle 30^\circ$ A respectively. Determine the line currents. **(04 Marks)**

c. In a 3ϕ, 4 wire system, the sequence voltages and currents are:

$V_{a1} = 0.9\angle 10^\circ$ PU ; $V_{a2} = 0.25\angle 110^\circ$ PU ; $V_{a0} = 0.12\angle 300^\circ$ PU ;

$I_{a1} = 0.75\angle 25^\circ$ PU ; $I_{a2} = 0.15\angle 170^\circ$ PU ; $I_{a0} = 0.1\angle 330^\circ$ PU

Find the complex power in PU. If the neutral gets disconnected, find the new power. **(06 Marks)**

Module-4

7 a. An unloaded fully excited three phone aftemafor is subjected to an L-G fault at its terminals. Find the fault current. Using symmetrical components by showing the interconnection of all sequence networks. **(08 Marks)**

b. Draw the sequence networks for the system shown in Fig.Q7(b). Determine the fault current if a line to line occurs at F. The PU reactances all referred to the same base are as follows. Both the generators are generating 1.0 PU.

Component	X_0	X_1	X_2
G_1	0.05	0.30	0.20
G_2	0.03	0.25	0.15
Line-1	0.70	0.30	0.30
Line-2	0.70	0.30	0.30
T_1	0.12	0.12	0.12
T_2	0.10	0.10	0.10

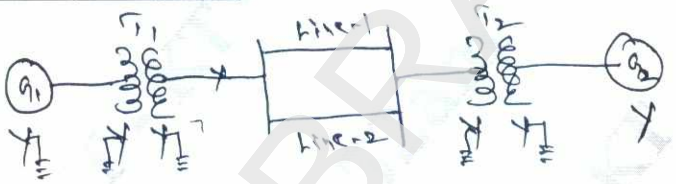

Fig.Q7(b) **(08 Marks)**

OR

8 a. Derive expression for fault current if Line-Line-Ground (LLG) fault occurs through fault impedance Z_f in power system. Show the connection of sequence networks to represent the fault. **(08 Marks)**

b. A three phase generator with an open circuit voltage of 400 V is subjected to an LG fault through a fault impedance of j2Ω. Determine the fault current is Z_1 = j4Ω, Z_2 = j2Ω and Z_0 = j1Ω. Repeat the problem for LL fault. **(08 Marks)**

Module-5

9 a. Explain 'equal area criteria' concept when a power system is subjected, to sudden loss of one of the 'parallel lines'. **(08 Marks)**

b. Define stability pertaining to a power system and classify the different types of stability. **(04 Marks)**

c. A 2 pole, 50 Hz, 11 KV turbo alternator has a rating of 100 MW, 0.85 p.f. lagging. The rotor has moment of inertia of 10000 kg-m^2. Calculate H and M. **(04 Marks)**

OR

10 a. Derive the power angle equation of a salient pole synchronous machine connected to an infinite bus. Draw the power angle curve. **(08 Marks)**

b. Derive an expression for the swing equation. **(08 Marks)**

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CBCS SCHEME

USN | | | | | | | | | |

15EE63

Sixth Semester B.E. Degree Examination, June/July 2019
Digital Signal Processing

Time: 3 hrs. Max. Marks: 80

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. Determine DFT of sequence $x(n) = \frac{1}{3}$ for $0 \le n \le 2$ for $N = 4$. Plot magnitude and phase spectrum. **(08 Marks)**

b. Two length – 4 sequence are defined below :

$$x(n) = \cos\left(\frac{\pi n}{2}\right) \quad n = 0, 1, 2, 3$$

$$h(n) = 2^n \quad n = 0, 1, 2, 3$$

i) Calculate $x(n) \circledast_4 h(n)$ using circular convolution directly.

ii) Calculate $x(n) \circledast_4 h(n)$ using Linear convolution. **(08 Marks)**

OR

2 a. Compute circular convolution using DFT + IDFT for following sequence :

$$x_1(n) = \{\underset{\uparrow}{2}, 3, 1, 1\}, \quad x_2(n) = \{\underset{\uparrow}{1}, 3, 5, 3\}.$$ **(08 Marks)**

b. Find the output of the LTI system whose impulse $h(n) = \{1, 1, 1\}$ and the input signal is $x(n) = \{3, -1, 0, 1, 3, 2, 0, 1, 2, 1\}$. Using the overlap save method. Use 6-pt circular convolution. **(08 Marks)**

Module-2

3 a. What are FFT algorithms? Explain the advantages of FFT algorithms over the direct computations of DFT for a sequence x(n). **(04 Marks)**

b. What are the differences and similarities between DIT and DIF –FFT algorithms? **(04 Marks)**

c. Find the 8-pt DFT of the sequence $x(n) = \{1, 2, 3, 4, 4, 3, 2, 1\}$. Using DIT – FFT radix – 2 algorithm. **(08 Marks)**

OR

4 a. Find the 4-pt circular convolution of x(n) and h(n) given. Using radix-2 DIF – FFT algorithm. **(08 Marks)**

Fig.Q4(a)

b. Given $x(n) = (n + 1)$ and $N = 8$. Determine X(K). Using DIF – FFT algorithm. **(08 Marks)**

Module-3

5 a. Convert the analog filter with system transfer function :

$$H(s) = \frac{(s+0.1)}{(s+0.1)^2 + 3^2}$$

into a digital IIR filter by mean of the impulse invariant method. **(06 Marks)**

b. Design a butter worth digital IIR lowpass filter using bilinear transformation by taking $T = 0.1\text{sec}$, to satisfy the following specification :

$$0.6 \le \left|H(e^{j\omega})\right| \le 1.0; \quad \text{for } 0 \le \omega \le 0.35\pi$$
$$\left|H(e^{j\omega})\right| \le 0.1; \quad \text{for } 0.7\pi \le \omega \le \pi$$

(10 Marks)

OR

6 a. Compare analog and digital filters. **(04 marks)**

b. Determine the poles of lowpass Butterworth filter for $N = 2$. Sketch the location of poles on s-plane and hence determine the normalized transfer function of lowpass filter. **(08 Marks)**

c. Write difference between IIR and FIR filter. **(04 Marks)**

Module-4

7 a. Design a Chebyshev digital IIR lowpass filter using impulse invariant transformation by taking $T = 1$ sec to satisfy the following specifications;

$$0.9 \le \left|H(e^{j\omega})\right| \le 1.0; \quad \text{for } 0 \le \omega \le 0.25\pi$$
$$\left|H(e^{j\omega})\right| \le 0.24; \quad \text{for } 0.5\pi \le \omega \le \pi$$

Draw direct form – I and II structure of the filter. **(12 Marks)**

b. Write the relation between analog and digital frequency in Billnear transformation. **(04 Marks)**

OR

8 a. Obtain the direct form – I, direct form II realization of the LTI system governed by the relation.

$$y(n) = -\frac{3}{8}y(n-1) + \frac{3}{32}y(n-2) + \frac{1}{64y}y(n-3) + x(n) + 3x(n-1) + 2x(n-2).$$

(08 Marks)

b. Realize the given system in cascade and parallel form :

$$H(z) = \frac{1 + 0.25z^{-1}}{(1 - 2z^{-1} + 0.25z^{-2})(1 - 3z^{-1} + 0.25z^{-2})}.$$

(08 Marks)

Module-5

9 a. The frequency response of a filter is described by : $H(\omega) = j\omega, -\pi \le \omega \le \pi$. Design the filter using a rectangular window. Take N = 7. **(08 Marks)**

b. Design a lowpass digital filter to be used in A/D – H(z) – D/A structure that will have – 3dB cutoff at 30π rad/sec and attenuation factor of 5dB at 45π rad/sec. The filter is required to have a linear phase and the system will use sampling frequency of 100 samples/sec. **(08 Marks)**

OR

10 a. Deduce the equation for the following frequency spectrum for rectangular window sequence defined by :

$$w_f(n) = \begin{cases} 1, & \frac{-(N-1)}{2} \le n \le \frac{N-1}{2} \\ 0, & \text{otherwise} \end{cases}.$$ **(06 Marks)**

b. A lowpass filter has the desired frequency response :

$$H_d(\omega) = \begin{cases} e^{-j\omega 3}, & 0 < \omega < \pi/2 \\ 0, & \text{otherwise} \end{cases}.$$

Determine h(n) based on frequency sampling method. Take K = 7. **(06 Marks)**

c. Realize the linear phase FIR filter having the following impulse response :

$$h(n) = \delta(n) + \frac{1}{4}\delta(n-1) - \frac{1}{8}\delta(n-2) + \frac{1}{4}\delta(n-3) + \delta(n-4).$$ **(04 Marks)**

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CBCS SCHEME

USN | | | | | | | | | | 15EE64

Sixth Semester B.E. Degree Examination, June/July 2019
Electrical Machine Design

Time: 3 hrs. Max. Marks: 80

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Use of design data handbook is permitted.
3. Any missing data may be suitably assumed.

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. Explain the principles of design of electrical machines. What are the limitations in design? **(06 Marks)**

b. What are the desirable properties of magnetic materials? Explain in brief magnetic materials and its classification. **(05 Marks)**

c. Give a brief comparison between copper and aluminium wires. **(05 Marks)**

OR

2 a. Classify the insulating materials used in electrical machines, according to their thermal stability. Give one example for each class. **(06 Marks)**

b. Write brief note on Cold Rolled Grain Oriented (CRGO) steel used in electrical machines. **(05 Marks)**

c. What are the desirable properties of conducting materials? **(05 Marks)**

Module-2

3 a. Define specific electric and magnetic loadings of D.C. machine. What are the merits and demerits of selecting higher values on specific loadings? Mention the factors to be considered during choice of specific loadings. **(08 Marks)**

b. A design is required for a 50kW, 4pole, 600rpm dc shunt generator. The full load terminal voltage is 220V. If the maximum gap density is 0.83Wb/m^2 and ampere conductors = 30,000ac/m, calculate suitable dimensions of armature core to give a square pole face. Assume that the full load armature voltage drop is 3% of rated terminal voltage and field current is 1% of rated full load current. The ratio of pole arc to pole pitch is 0.67. **(08 Marks)**

OR

4 a. Discuss the various factors which govern the choice of number of poles in a D.C. machine. **(08 Marks)**

b. A shunt field coil has to develop an mmf of 9000A. The voltage drop in the coil is 40V and the resistivity of the round wire is 0.021Ω/m/mm^2. The depth of the winding is 35mm approximately and the length of the mean turn is 1.4m. Design a coil so that the power dissipated is 700 W/m^2 of the total coil surface. Take diameter of the insulated wire 0.2mm greater than the bare wire. **(08 Marks)**

Module-3

5 a. Derive the output equation of a 3 phase core type transformer and hence deduce an expression for output-emf/turn. **(08 Marks)**

b. Calculate the main dimensions and winding details of a 100kVA, 2000/400V, 50Hz, 1ϕ shell type, oil immersed self cooled transformer. Assume voltage per turn = 10V, flux density in core = 1.1 Wb/m^2, current density = 2A/mm^2, window space factor = 0.33, the ratio of window height to window width is 3, ratio of core depth to width of central limb = 2.5, stacking factor = 0.9. **(08 Marks)**

OR

6 a. Explain the procedure to calculate the no-load current for a single phase transformer. **(08 Marks)**

b. A 250kVA, 6600/400V, 3ϕ core type transformer has a total loss of 4800W at full load. The transformer tank is 1.25m in height and 1m × 0.5m in plan. Design a suitable scale for number of tubes, if the average temperature rise is limited to 35°C. The diameter of the tube is 50mm and are spaced 75mm from each other. The average height of the tube is 1.05m. Specific heat dissipation due to radiation and convection is respectively 6 and 6.5 W/m^2 °C. Assume convention is improved by 35% due to provision of tubes. **(08 Marks)**

Module-4

7 a. With usual notations, derive the output equations of a 3ϕ induction machine. **(08 Marks)**

b. Calculate the diameter of stator bore and core length of a 70HP, 415V, 3ϕ, 50Hz, Y connected, 6 pole Induction motor for which q = 32000 Ac/m, B_{av} = 0.51 T, efficiency = 90%, p.f. = 0.91. Assume pole pitch equal to core length. Estimate the number of stator conductors required for a winding in which the conductors are connected in two parallel paths. Choose a suitable number of conductors/slot, so that the slot loading does not exceed 750 Ampere conductors. **(08 Marks)**

OR

8 a. Discuss the factors to be considered while deciding the length of air gap, number of stator and rotor slots in an Induction motor. **(08 Marks)**

b. A 15kW, 3ϕ, 6 pole, 50Hz, squirrel cage Induction motor has the following data: stator bore dia = 0.32m, axial length of stator core = 0.125m, number of stator slots = 54, number of conductors/stator slot = 24, current in each stator conductor = 17.5A, full load power factor = 0.85 lagging. Design a suitable cage rotor giving number of rotor slots, section of each bar, section of each ring. The full load speed is to be 950rpm approximately. Use copper for rotor bars and end rings. Resistivity of copper = 0.02Ω/m and mm^2. Assume δ = 7A/mm^2 for end rings. **(08 Marks)**

Module-5

9 a. Derive an output equation of a synchronous machine and show that $HP = \frac{\text{Input KVA} \times \eta \times \cos\phi}{0.746}$. **(08 Marks)**

b. A 1000KVA, 3300V, 50Hz, 300rpm, 3ϕ alternator has 180 slots with 5 conductors/slot, single layer winding with full pitch coils is used. The winding is star connected with one circuit per phase. Determine the specific electric and specific magnetic loadings, if the stator bore is 2.0m and the core length is 0.4m. Using the same loadings, determine corresponding data for a 1250kVA, 3300V, 50Hz, 250rpm, 3ϕ star connected alternator having 2 circuits per phase. The machines have 60° phase spread. **(08 Marks)**

OR

10 a. What is SCR of a synchronous machine? What are the effects of SCR on machine performance? **(08 Marks)**

b. A 2500kVA, 225rpm, 3ϕ, 60Hz, 2400V, Y-connected salient pole alternator has the following design data: stator bore = 2.5m, core length = 0.44m, slot/pole/phase = 3, conductors/slot = 4, circuits/phase = 2, leakage factor = 1.2, winding factor = 0.95.
The flux density in the pole core is 1.5 Wb/m^2, the winding depth is 30mm, the ratio of full load field mmf to armature mmf is 2, field winding space factor is 0.84 and the field winding dissipates 1800 W/m^2 of inner and outer surface without the temperature rise exceeding permissible limit. Leave 30mm for insulation, flanges and height of pole shoe along the height of pole. Find: i) The flux per pole ii) Length and width of pole iii) Winding height iv) Pole height. **(08 Marks)**

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CBCS SCHEME

USN | | | | | | | | | | |

15EE662

Sixth Semester B.E. Degree Examination, June/July 2019
Sensors and Transducers

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. What is transducer? How are they classified? **(06 Marks)**
b. What are the advantages of electrical transducers? **(05 Marks)**
c. Explain variable reluctance transducer. **(05 Marks)**

OR

2 a. Explain the working of Piezoelectric accelerometer. List the advantages, disadvantages and application of Piezoelectric transducers. **(06 Marks)**
b. Explain the working of LVDT with advantages, disadvantages and its applications. **(06 Marks)**
c. Explain the displacement measurement using Hall effect transducers. **(04 Marks)**

Module-2

3 a. Explain the working of semi conductor strain gauges with advantages and disadvantages. **(06 Marks)**
b. Explain: i) Pneumatic Sensors ii) Eddy current proximity sensors. **(06 Marks)**
c. What are digital transducers? What are the advantages of them? **(04 Marks)**

OR

4 a. Explain the working of synchros and Resolvers, mentioning their advantages. **(08 Marks)**
b. Explain MEMS accelerometer with its applications and advantages. **(04 Marks)**
c. What are the factors need to be considered for selecting a sensor for a particular application? **(04 Marks)**

Module-3

5 a. What are the functions of signal conditioning equipment? **(05 Marks)**
b. What is an op-amp? State the characteristics of an op-Amp. **(05 Marks)**
c. What you mean by filter and filtering? How are the filters classified? **(06 Marks)**

OR

6 a. Draw the block diagram of a generalised Data Acquisition system and explain it briefly. **(06 Marks)**
b. Explain the working of a multi channel analog multiplexed data acquisition system. **(05 Marks)**
c. Explain briefly the R-2R Ladder D/A converter and PWM. **(05 Marks)**

Module-4

7 a. With the help of a block diagram, explain the working of telemetering system. **(05 Marks)**
b. Explain briefly the amplitude modulation and frequency modulation. **(06 Marks)**
c. What is a modem? Explain with interfacing block diagram. **(05 Marks)**

OR

8 a. Explain inductance type pressure transducers. **(04 Marks)**

b. Define :

i) Atmospheric pressure
ii) Gauge pressure
iii) Absolute pressure
iv) Static pressure
v) Total pressure, with the help of schematic diagram. **(06 Marks)**

c. Give the construction and working of a hot filament congation gauge. List its advantages and disadvantages. **(06 Marks)**

Module-5

9 a. What is "Seebeck effect"? explain with a neat diagram the construction and working of a thermoelectric pyrometer. **(08 Marks)**

b. Briefly explain: i) Rotometer ii) ELbow meter. **(08 Marks)**

OR

10 a. Explain briefly : i) DC tachometer generator ii) AC tachometer generator **(08 Marks)**

b. Explain : i) Piezo electric accelerometer ii) Ultra sonic Liquid level gauge. **(08 Marks)**

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