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SE - Sem - IV _ CBSGS - EXTC / Electrical

AM - IV

28/11/17

B - 4 / 18

Q. P. Code: 24361

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

N.B. : 1) Question No. **1** is **Compulsory**.

2) Answer **any THREE** questions from Q.2 to Q.6.

3) Figures to the right indicate full marks.

Q.1 (a) If λ is eigen value of A and X is corresponding eigen vector of λ then show that λ^n is eigen value of A^n and corresponding eigen vector is X $(n>0)$. (5)

(b) Evaluate $\int_C \frac{z^2-2z+4}{z^2-1}dz$, where C is $|z-1|=1$. (5)

(c) Find the extremals of $\int_{x_0}^{x_1}(1+x^2y')y'\,dx$. (5)

(d) Find a unit vector orthogonal to both $u=(-3,2,1)$ and $v=(3,1,5)$. (5)

Q.2

(a) Find eigen values and eigen vectors of A^2+2I where $A=\begin{bmatrix}8 & -8 & -2\\ 4 & -3 & -2\\ 3 & -4 & 1\end{bmatrix}$. (6)

(b) Find the extremals of $\int_{x_0}^{x_1}\left[(y'')^2-y^2\right]dx$. (6)

(c) Obtain Laurent's series expansion of $f(z)=\frac{4z+3}{z^2-z-6}$ at $z=1$. (8)

Q.3 (a) Using Rayleigh-Ritz method find solution for the extremal of the functional $\int_0^1\left[(y')^2-2y-2xy\right]dx$ with $y(0)=2$ and $y(1)=1$. (6)

(b) Evaluate $\int_0^\infty \frac{1}{(x^2+1)(x^2+9)}dx$. (6)

(c) Show that matrix $A=\begin{bmatrix}-9 & 4 & 4\\ -8 & 3 & 4\\ -16 & 8 & 7\end{bmatrix}$ diagonalizable. Also find diagonal and transforming matrix. (8)

[Turnover]

Q.4

a) Verify Cayley Hamilton Theorem for $A=\begin{bmatrix}1 & 2 & -2\\ -1 & 3 & 0\\ 0 & -2 & 1\end{bmatrix}$. Also find A^{-1}. (6)

(b) Using Cauchy's Residue Theorem evaluate $\int_0^{2\pi}\frac{d\theta}{3+2\cos\theta}$. (6)

(c) Show that the extremal of isoperimetric problem $I=\int_{x_1}^{x_2}(y')^2\,dx$ subject to the condition $\int_{x_1}^{x_2} y\,dx=k$ is a parabola. (8)

Q.5 (a) Find 5^A where $A=\begin{bmatrix}3 & 1\\ 1 & 3\end{bmatrix}$. (6)

(b) Find an orthonormal basis for the subspace of R^3 by applying Gram-Schmidt process where $S=\{(1,1,1),(-1,1,0),(1,2,1)\}$. (6)

(c) Reduce the following quadratic form into canonical form and hence find its rank, index, signature and value class (8)
$Q=5x_1^2+26x_2^2+10x_3^2+6x_1x_2+4x_2x_3+14x_3x_1$.

Q.6 (a) State and prove Cauchy-Schwartz inequality. Hence show that for real values of a,b,θ $(a\cos\theta+b\sin\theta)^2\le a^2+b^2$. (6)

(b) Show that any plane through origin is a subspace of R^3. (6)

(c) Find the singular value decomposition of $A=\begin{bmatrix}4 & 4\\ -3 & 3\end{bmatrix}$. (8)

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Q.P. Code: 20824

[Time: Three Hours] [Marks:80]

Please check whether you have got the right question paper.

N.B.:- (1) Question No.1 is compulsory.
(2) Attempt any Three questions out of remaining five questions.
(3) Assume suitable data if necessary and justify the same.

Q1. Answer the following questions.

A) Explain Skin effect with diagram. **05**

B) Prove that PU impedance of transformer can be made same referred to both winding by selecting proper voltage bases on either sides. **05**

C) Explain typical AC system with single line diagram. **05**

D) Compare overhead and underground system. **05**

Q2a) Explain effect on line capacitance. Also explain method of images. **10**

Q2b) A 3-phase 50 Hz overhead transmission line has the following distributed constants.. **10**
Resistance= 28 ohms , Inductive reactance = 63 ohms
Capacitive susceptance= 4×10^{-4} mho
If load at the receiving end is 75MVA at 0.8 pf lagging with 132 KV between lines calculate Voltage, Current, power factor at the sending end. Use nominal T method.

Q 3 a) What is String efficiency and explain the methods of improving String efficiency? **10**

Q3 b) A 3-phase, 50Hz, 132 KV overhead line has conductor placed in a horizontal plane 4.56 m apart. Conductor diameter is 22.4 m. If the line length is 100km, calculate the charging current per phase. **10**

Q4 a) Derive mathematical expression for capacitance of single core cable. **10**

Q4 b) A 3 phase transmission lines have the generalized constants **10**
$A_1=D_1= 0.98\angle 2^0$, $B_1 = 28\angle 69°$ ohm , $C_1= 0.OOO2\angle 88^0$ mho,
$A_2=D_2= 0.95\angle 3^0$, $B_2=40\angle 85°$ ohm, $C_2=0.0004\angle 90°$ mho
They are connected in series and deliver a load current of 200A at 0.95 pf at 110KV. Determine the sending end voltage and current.

Q 5 a) Explain different method of neutral grounding. **10**

Q5 b) A transmission line has a span of 150m between level supports. The Cross sectional area of the conductor is 1.25 cm2 and weight 100kg per 100 m. If the breaking stress is 4220 Kg/cm2. Calculate the factor of safety if the sag of the line is 3.5 m. Assume a maximum wind pressure of 100 Kg per sq meter. **10**

Q6) Solve any Two

a) Explain grading of cables and its types. **10**

b) Explain power flow through transmission line. **10**

c) Derive expression for capacitance of 3-Phase line with equilateral spacing. **10**

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SE - Electrical - Sem - IV - CBSGS 05-12-17

EM - I

(15)

QP Code : 27101

[3 Hours] [Total Marks : 80]

N.B : 1. Question no. 1 is compulsory.
2. Attempt any three from remaining question.
3. Figures to the right indicate full marks.

1. Attempt any **four** questions.
   (a) Explain the Electrochemical energy convesion ? 5
   (b) What are the advantages of Hopkinson's test ? 5
   (c) Explain the core losses in transformer. 5
   (d) Draw the characteristics of D.C. shunt motor. 5
   (e) What is the role of commutator in D.C. machine ? 5

2. (a) With the help of phasor diagram derive the equation to obtain voltage regulation in single phase transformer. 10
   (b) Derive the expression for torque developed in singly excited magnetic field. 10

3. (a) 700 kVA single phase transformer with 0·12 p.u. resistance and 0·06 p.u. reactance is connected in parallel with 350kVA transformer with 0·014 p.u. resistance and 0·045pu reactance to share a load of 850 KVA at 0·7 p.f. lagging. If transformer are having common voltage ratio, calculate load shared by each of them. 10
   (b) Explain all day efficiency of transformer. 10

4. (a) What are the different methods of Electrical braking. 10
   (b) Hopkinonsons test of two identical shunt machines gave following results. 10
   Input voltage = 400V, Input current = 10A, output current of generator = 100A, field currents are 3A and 4A, Armature resistance of each machine = 0·06 find the efficiency of motor and generator

5. (a) 5KVA, 200/600 V, 50 Hz single phase transformer gave following test result. 10
   O.C. test : 200V, 0·9 A, 60W (L.V.)
   S.C. test : 10V, 6A, 22W (H.V)
   Calculate (i) Efficency and voltage regulation and full load 0·8. (ii) Efficiency at 25% load at unit p.f.
   (b) Draw what is the ned of starter ? Explain 3 point starter. 10

6. Write the short note on
   (a) Speed control of D.C. shunt motor. 10
   (b) Doubly excited magnetic field. 10

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Q.P. Code :24726

[Time: 03 Hours] **[Marks:80]**

Please check whether you have got the right question paper.

N.B:
1. Q.1 is compulsory.
2. Attempt any three questions from remaining questions
3. Assume suitable data wherever required.

Q.1 a) Find even and add components for h(n)=(2,3,1,2,3) ↑ **05**

b) Find z- transform of the following x (n) =cos wn u (n). **05**

c) Find the sequence for: - x (n) = δ(n) + 2 δ (n - 1) - δ (n - 2). **05**

d) Give proof of any two properties of Z-Transform. **05**

Q.2 a) Identify the filter based on its pass band by analytical method. Draw pole-zero plot: **10**
$H(z)=\frac{1}{1+0.08z^{-1}}$

b) Find X(K), using DIT- FFT algorithm for given sequence : **10**
x(n) = {1,2, 3,4,4,3,2,1}.

Q.3 a) Sketch the signals using step and ramp signals. **10**
x(t) = t u(t) - (t - 1)u(t -1) + u(t - 2) - 3 u(t - 3).
x(t) = 2 δ (n) + 3 δ (n -2)

b) System is described by the difference equation : **10**
y(n) = y(n + 1) + x(n) + x(n - 1)
Find: 1) Transfer function 2) Impulse response

Q.4. a) Find out circular convolution to the following sequence using DFT and IDFT: **10**
x(n) = {1, 1, 2, 1} h(n) = {1,2,3,4}.

b) Classify the following systems as linear / nonlinear , variant / invariant, causal /non-causal and dynamic / static **10**
1 $y(n) = e^{x(n)}$
2 y (n) = A x(n) + B

Q.5 a) Find Z-inverse transform of the following: **10**
$X(z)=\frac{1}{1-1.5z^{-1}+0.5z^{-2}}$
For:
1. Causal system
2. Anti-causal system
3. Stable system

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b) Find out linear convolution of the following: 10
$x(n) = \{1,2,3\}$ $h(n) = \{1,2\}$.
Find out linear convolution using circular of the following: 10
$x(n) = \{1,2\}$ $y(n) = \{2,3,4\}$.

Q.6 Write short note on **any Two** 20

1. Properties of DFT
2. Min, Max on Mix phase system
3. Significance of ROC in z- transform with examples
4. Types of signals

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SE - Electrical - sem-IV - CBSGS - AOIC 18/12/17

[Time: 3 Hours] [Marks:80] Q.P.Code: 25661

Instructions: 1) Question **No. 1** is compulsory.
2) Answer **any three** from **remaining five.**
3) Assume data where ever needed.

1		**Answer any four**	
	a)	State and prove Demorgans theorem.	5
	b)	Explain in brief CMRR, slew rate.	5
	c)	Convert following (i) 101101 to gray code (ii) $(CD8.4)_{16}$ to octal	5
	d)	Convert SR to JK flip flop.	5
	e)	Explain in brief types of registers.	5
2	a)	Explain 555 timer working as astable multivibrator.	10
	b)	Explain first order low pass filter. Design a low pass filter at a cut off frequency of 1kHz with a pass band gain of 2. Also plot the frequency response curve. Assume C=0.01μF.	10
3	a)	Design a mod-5 synchronous counter using JK flip flop without lockout.	10
	b)	Minimize the expression using K map and implement using NAND gates only. $F = \Sigma(0,5,9,12,13,14,15) + d(1,2,3,4)$	10
4	a)	Explain successive approximation type ADC.	10
	b)	Explain TTL logic families.	10
5	a)	Implement following expression using (i) 8:1 Mux (ii) 4:1 Mux $F(A,B,C) = \Sigma(0,2,5,6,7)$	10
	b)	Explain ideal and practical differentiator.	10
6	a)	Design and implement 3bit gray to binary code converter.	10
	b)	Explain Schmitt trigger with necessary waveforms.	10

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(7) SE-EXTC/AMOT/sem-IV CBSGS 22/12/2017

Q.P. Code: 24009

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

Note:

- Question **1** is **compulsory**.
- Solve ant **three** questions from questions no. 2 to 6.
- Assume necessary data wherever necessary.

Q1 Answer the following questions **20**

a) What do you mean by an error? Discuss propagation of error with suitable example.

b) Write the algorithm for golden section search method.

c) What is the need for optimization? Explain constrained optimization.

d) What do you mean by bracketing method? Discuss the methods with suitable example.

Q2 a) Solve the equation $y'' = 8 + 6xy'$ using 4^{Th} order RK method at $x=0.2$ correct up to 4decimal places. Initial conditions are $x = 0$, $y = 0$, $y' = 0.1$. The step size $h = 0.2$ **10**

Q2 b) Solve the equation $\frac{dy}{dx} = 2x + y$ using Milne's Predictor-Corrector method. Find y at $x = 0.4$ and $x = 0.5$ with step size of 0.1. Given that $y(0) = 0.2$, $y(0.1) = 0.2313$, $y(0.2) = 0.2870$, $y(0.3) = 0.3696$. **10**

Q3 a) Write the algorithm for Newton's divided difference interpolation. For the following data, find y at $x = 4.8$. **10**

x	4	5	7	10	11	13
y	48	100	294	900	1210	2028

Q3 b) *Minimize* $Z = 2x_1^2 + x_2^2$ **5**

subjected to $x_1 + x_2 = 1$

$x_1, x_2 \geq 0$

Using Lagrange's multiplier method.

Q3 c) What are the basic requirements of Linear programming? Discuss the various terms used in LPP. **5**

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Q4 a) Solve the following system of equations using LU method. What are the advantages of this method? **10**

$$x + y + z = 1$$
$$4x + 3y - z = 6$$
$$3x + 5y + 3z = 4$$

10

Q4 b) Solve using Secant method to obtain root of equation $xe^x - \cos 3x - 0.51 = 0$. Do four iterations. Write the algorithm for the same.

10

Q5 a) Minimize cost $Z = 400x_1 + 800x_2$
subject to
$6x_1 + 2x_2 \geq 12$
$2x_1 + 2x_2 \geq 8$
$4x_1 + 12x_2 \geq 24$
$x_1, x_2 \geq 0$ using graphical method. **10**

Q5 b) Determine root of equation $f(x) = 0.51x - sinx$ using Newton Raphson method for three iterations. **10**

Q6 a) Using Simplex method solve **10**

$$Max\ Z = 3x_1 + 2x_2$$
$$subjected\ to\ \ x_1 + x_2 \leq 4$$
$$x_1 - x_2 \leq 2$$
$$x_1, x_2 \geq 0$$

Q6 b) Solve the equation $dy/dx = 1 + xy^2$ with $y(0) = 0.2$ using Adam's Bashforth method. Determine y at x=0.5 with a step size of 0.1. **10**

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