270

SE-Sem-IV-CBSGS-Electrical/EXTC-AM-IV.

19/5/17

Q.P. Code : 11837

[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 from the remaining.

Q.1. a) Find the extremal of $\int_{x_0}^{x_1} \frac{1+y^2}{y'^2} dx$ **(5)**

b) Is $(6,7,-4)$ a linear combination of $v_1 = (1,2,2), v_2 = (3,4,6)$ **(5)**

c) Check whether $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \\ 3 & 4 & 5 \end{bmatrix}$ is derogatory or not. **(5)**

d) Evaluate $\int_0^{1+i} z^2 dz$, along the parabola $x = y^2$ **(5)**

Q.2. a) Show that the functional $\int_0^{\pi/2} \left\{ 2xy + \left(\frac{dx}{dt}\right)^2 + \left(\frac{dy}{dt}\right)^2 \right\} dt$; such that $x(0) = 0, x\left(\frac{\pi}{2}\right) = -1,$

$y(0) = 0, y\left(\frac{\pi}{2}\right) = 1$ is stationary if x=-sint, y=sint. **(6)**

b) Evaluate $\int_{-\infty}^{\infty} \frac{x^2}{(x^2+a^2)(x^2+b^2)} dx, a > 0, b > 0$ **(6)**

c) Reduce the quadratic form $x^2 - 2y^2 + 10z^2 - 10xy + 4xz - 2zy$ to canonical form and hence, find its rank, index and signature and value class. **(8)**

Q.3. a) Verify Cayley Hamilton theorem for $A = \begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{bmatrix}$ and hence find A^{-1} & A^4 **(6)**

b) Using Residue theorem evaluate $\int_C \frac{e^z}{z^2+\pi^2} dz$ where C is |z|=4. **(6)**

c) Find the singular value decomposition of $\begin{bmatrix} 2 & 3 \\ 0 & 2 \end{bmatrix}$ **(8)**

Q.4. a) If $A = \begin{bmatrix} -1 & 4 \\ 2 & 1 \end{bmatrix}$, prove that 3tanA=Atan3 **(6)**

b) Find the sum of the residues at singular points of $f(z) = \frac{z-4}{z(z-1)(z-2)}$ **(6)**

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c) Check whether the set of real numbers (x,0) with operation $(x_1,0)+(x_2,0)=(x_1+x_2,0)$, and $k(x_1,0)=(kx_1,0)$ is a vector space. **(8)**

Q.5. a) Find the extremum of $\int_{x_0}^{x_1}(2xy-y''^2)dx$. **(6)**

b) Construct an orthonormal basis of R^3 using Gram Schmidt process to S = {(3,0,4),(-1,0,7),(2,9,11)} **(6)**

c) Find all possible Laurent's expansions of $\frac{2z-3}{z^2-4z-3}$ about $z=4$. **(8)**

Q.6. a) Find the linear transformation Y=AX which carries $X_1=(1,1,-1)', X_2=(1,-1,1)', X_3=(-1,1,1)'$ onto $Y_1=(2,1,3)', Y_2=(2,3,1)', Y_3=(4,1,3)'$ **(6)**

b) Show that the vectors $v_1=(1,2,4), v_2=(2,-1,3), v_3=(0,1,2)$ are linearly independent. Express $v_4=(-3,7,2)$ in terms of v_1, v_2, v_3 **(6)**

c) If C is circle |z|=1, using the integral $\int_C \frac{e^{kz}}{z}dz$ where k is real, show that

$$\int_0^{\pi} e^{k\cos\theta}\cos(k\sin\theta)d\theta=\pi$$ **(8)**

SE - sem-IV - Electrical - CBSGS - EPS

15/5/17

Q.P. Code: 13602

[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

Q 1. Answer the following questions.

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

B) Prove that PU impedance of transformer can be made same reffered 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**

Q 2 a) Explain effect on line capacitance. Also explain method of images. **10**

Q 2 b) A 200 Km long 3-Phase overhead line has resistance of 48.7 Ω/Phase, inductive reactance of 80.20 Ω/phase and capacitance of 8.42nF/Km. It supplies a load of 13.5MW at a voltage of 88KV and power factor 0.9 lagging. Using nominal T circuit , find the sending end voltage , current, regulation and power angle. **10**

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

Q 3 b) A 3-phase 132 KV, 100Km, 50 Hz single circuit line has horizontal spacing with 3.5m between adjacent conductors. The conductor diameter is 1.2 cm. Find the line capacitance/ phase and charging current /phase. **10**

Q 4 a) Derive mathematical expression for capacitance of single core cable. **10**

Q 4 b) Synchronous Generator:- 20 MVA ,11 KV, X"= 0.15PU **10**
Synchronous Motor 1 :- 10 MVA, 11KV, X"= 0.15PU
Synchronous Motor 2 :- 10 MVA, 11KV, X"= 0.15PU
Synchronous Motor 3 :- 10 MVA, 11KV, X"= 0.15PU
Transformer T1:- 25 MVA, 12.5 Δ/132Y KV, X=j0.1 PU
Transformer T1:- 20 MVA, 132Y/11 Δ KV, X=j0.1 PU.

Draw Impedance diagram for the system choose base voltage of 132 KV for the transmission line and base voltampere of 20 MVA. Transmission line reactance = 200+j500Ω.

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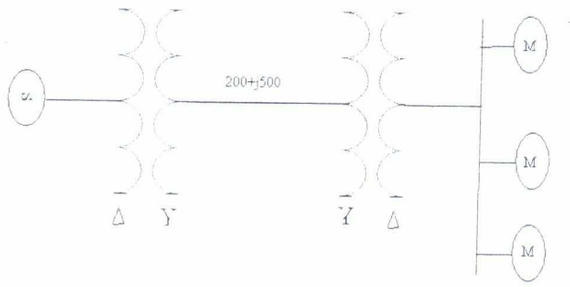

Q 5 a) Explain different method of neutral grounding.. 10

Q 5 b) An overhead line over a river crossing is supported by two tower 50 m and 80 m above water level. The horizontal span is 300 m . If the weight of conductor is 8.28 N/m and the tension in the conductor is 1920 N. Find the height of midpoint of the line above water level 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-sem-IV - CBSGS - Electrical

25/5/17

T1224 / T1026 ELECTRICAL MACHINES I

Q.P. Code : 16505

[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 from the remaining questions.
3. Figures to right indicate full marks.

Q. 1 Attempt any four questions.

a) Explain the use commutator in DC motor and generator. (05)
b) Explain, haw the core flux- set up in transformer is maintain constant from no load to fidl load. (05)
c) What are the drawbacks of three point starter compare to four" point starter. (05)
d) What is the condition at which transformer will have maximum efficiency. (05)
e) Justify the sentence that we obtain Iron loss from OC test and copper loss from SC test. (05)

Q. 2 a) Derive the expression for torque developed in singly excited magnetic field. (10)
b) What is commutation and explain the process of commutation in DC generator. Also mention the methods to improve the commutation process. (10)

Q. 3 a) With the help of phasor diagram, derive the equation to obtain approximate voltage regulation in single phase transformer. (10)

b) A DC shunt motor connected across 440v supply, takes an armature current of 20 A and run at 500 RPM. The armature resistance is 0.6 ohms. If the magnitude of flux is reduced by 30 % and torque developed by armature increases by 40 %, what is the speed of motor. (10)

Q. 4 a) Derive the expression to obtained ATd/pole and A7'c/pole in case of' armature reaction. (10)

b) A 100 kW, 460 V DC shunt generator was run as motor on no load at it rated voltage and, speed. The total current taken was 9.8 A, including shunt current of 2.7 A. The resistance of armature circuit is 0.11 ohms. Calculate the efficiency at full load and half load. (10)

Q. 5 a) Derive an expression for copper saving in auto transformer. (10)
b) Two single phase transformers which have the same turns ration are connected in parallel and supply a total load of 800 kW at 0.8 p.f. lagging. The rating are as follows. (10)

	Rating	p.u resistances	p.u reactances
Transformer A	400KVA	0.02	0.04
Transformer B	600 KVA	0.01	0.05

Determine the power output and power factor of each transformer.

Q. 6 Write short notes on (10)
i) Sumpner's Test on single phase transformer.
ii) Electrical braking methods for separately excited DC motor.

Q.P.Code: 016114

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

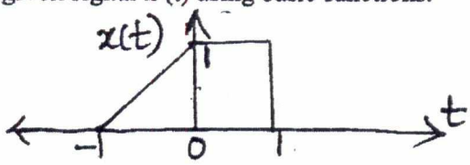
N: B 1) Q1 is compulsory.

2) Attempt any **three** questions from remaining questions

3) Assume suitable data wherever required.

Q1) a) State and prove differentiation property of z-transform.

b) Express the given signal x (t) using basic functions. [5*4]



c) Determine the stability and causality of the system described by

$$H(z) = \frac{1}{1-0.5z^{-1}} + \frac{1}{1-2z^{-1}} \text{ for ROC } 0.5 < |z| < 2$$

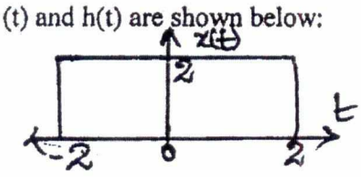
d) Check the stability and Time invariance property of the system y[n] = x [-n]

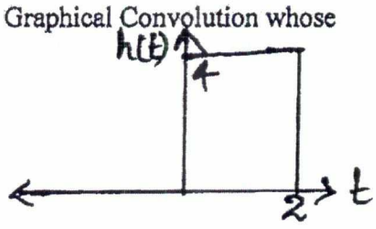
Q2) a) Find the even and odd components of x[n] = {-1, 7,-2, 3,-7, 6} [05]

b) Find the initial value and final value of

$$X(z) = \frac{z}{4z^2-5z-1} \quad \text{ROC } |Z| > 1$$ [05]

c) Find the response y (t) of an LTI system by Graphical Convolution whose x (t) and h(t) are shown below: [10]





Q3) a) What do you mean by ROC? Mention the significance. Find the ROC of infinite duration Left sided signal.

b) Find the Fourier transform of x (t) = e^{-3t} u (t-2) [5*4]

c) Check whether the given signal x (t) = $\sin^2 w_o t$ is power signal or not.

d) Obtain the z-transform of x (n) = (n-3) u (n)

[TURN OVER]

Q4 a) Find the phase and magnitude response of the system h(n)= [1, -1/2] (10M)

b) A causal LTI system is described by the difference equation. (10M)

y (n)-3/4y(n-1)+1/8y(n-2)=u(n)+u(n-1) .Find the forced response of the system due to step input.

Q5 a) Find the Z transform of the given signal x(n) $= 1 \quad n \geq 0$ (10M)
$= 3^n \quad n < 0$

b)An discrete time LTI system governed by the difference equation: (10M)

Y (n) = x (n) + 0.8 x (n-1) + 0.8 x (n-2) - 0.49 y(n-2).

Determine the transfer function. Sketch the pole zero plot on the Z plane.

Q6 a)An 8 point sequence is given by x(n)={1,2,3,4,4,3,2,1}.Compute 8 point DFT of x(n) by radix -2 DIT – FFT method. (10M)

b) Perform the circular convolution using DFT. $X_1(n)$={2,1,2,1} $X_2(n)$={1,2,3,4} (10M)

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T1224 / T1028 ANALOG AND DIGITAL INTEGRATED CIRCUITS

SE - sem-IV - CBSGS - Electrical

7/6/17

Q.P. Code :16094

[Time: 3 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 remaining five questions.
3. Assume suitable data if necessary and justify the same.

Q1 Attempt any **FOUR**: 20

a. Discuss the characteristics of ideal op-amp. Compare ideal and practical op-map.

b. Draw and explain the functional block diagram of IC 555.

c. Justify "NAND gate is a Universal gate."

d. What are shift registers? State its applications.

e. State various characteristics of digital ICs.

Q2. a. Explain the working of practical integrator circuit using op-map. How it is different from ideal integrator circuit. 10

b. Draw and explain the working of three op-amp instrumentation amplifier. Derive the expression for its gain. 10

Q3. a. Derive the expression for the gain of first order low pass filter and draw its frequency response characteristics. 10

b. Explain operation of monstable multivibrator using IC555. Derive the expression for on time, off time and frequency. 10

Q4. a. Simplify the following logic expression and realize them using gates 10
$F(A,B,C,D) = \pi M (2,8,9,10,11,12,14)$

b. Design 4-bit Gray to Binary code converter. 10

Q5. a. Design a synchronous Mod-6 counter using J-K flip-flop. 10

b. Explain the working of successive approximation A/D converter. 10

Q.6 Solve any **FOUR** 20

a. Convert JK flip top to SR flip flop.

b. Implement the following logic function using 8:1 MUX
$F(A,B,C,D) = \Sigma m (1,3,4,11,12,13,14,15)$

c. Differentiate between combinational and sequential circuits.

d. Reduce the expression :

$$f = A[B + \bar{C}\ \overline{(AB + A\bar{C})}$$

e. i) Convert $(115)_{10}$ into hexadecimal number.

ii) Convert $(A6F.C9)_{16}$ into Octal number.

SE - sem - IV — OBSCs - Electrical

13/08/.

T1224 / T1029 NUMERICAL METHODS AND OPTIMIZATION TECHNIQUES

Q.P. Code :16319

(3 Hours) [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.

Q1 Answer the Following:-

a What are the necessary and sufficient condition to solve multiple unconstrained optimization problem analytically? **5**

b Compare Bracketing and open method for solving root problem. **5**

c Explain any one disadvantage of LU decomposition method with the technique to reduce it. **5**

d Write one machine independent error in numerical computation. How it occurs and how it can be reduced? **5**

Q2 a Solve the following set of differential equations using 4th order Runga Kutta method with h=0.5. Assume that at x=0, y=4 and z=6. Integrate to x=1 with a step size of 0.5. $\frac{dy}{dx} = -0.5y$; $\frac{dz}{dx} = 4 - 0.3z - 0.1y$. **10**

b Set up a divided difference table for a function f(x) which takes the values: f(0) =1, f(2) =1.2, f(4) =11.8 and f(5) =24.75. Express the cubic interpolating polynomial in Newton form and use it to estimate f(3). **06**

c With two approximations of Picard's method solve the following differential equation, $\frac{dy}{dx} = x^2y + x$, given that y=0 when x=0. **04**

Q3 a Write the algorithm for computing a simple root of an equation f(x) = 0 using False position method. Write any two comparison of this method with Secant method. Obtain a root for $f(x) = 2sinx - 3x + 2$ using False position method. Consider the initial guesses as x_l=1, x_u=2 where x is in radians and iterate until the relative error is less than 0.5%. **10**

b Optimize $Z=7x_1-0.3x_1^2+8x_2-0.4x_2^2$ subjected to the following constraint, $g=4x_1+5x_2=100$, using Lagrange's multiplier method. **05**

c Solve the following LP problem using Graphical method. **05**

Maximize $Z=30x_1+20x_2$

Subject to $x_1-x_2 \geq 1$; $x_1+x_2 \geq 3$; $x_1, x_2 \geq 0$

Q4 a What is meant by interpolation? Discuss any two advantage of Lagrange's method over Newton's divided difference. Employ inverse interpolation of order 2 to determine the value of 'x' that corresponds to f(x)=0.93 for the following tabulated data. Choose the sequence of the points for your estimates to attain the best possible accuracy. 10

x	1	2	3	4
F(x)	0.5	0.8	0.9	0.941

b What is the advantage of multistep over single step method to solve ordinary differential equation? Explain with an example in each case. 10

Q5 a Solve the equations $x^2 - y^2 = 2$ and $5x^2 - y^2 = 0$ with $x_0 = 0.4$, $y_0 = 1.0$ using N.R. method. Perform 2 iterations. 10

b Solve the following LP problem using Simplex method. 10

Maximize $Z=6x_1+5x_2$

Subjected to $x_1+x_2 \leq 5$; $3x_1+2x_2 \leq 12$; $x_1, x_2 \geq 0$.

Q6 a Employ Newton's method to find the maximum of $f(x)= 8x-x^3$. Consider the initial guess for x as 1 and iterate till the error is less than 5% 10

b Solve the following system of equations using LU decomposition. 10

$x + y + z = 2$

$x + 2y + 6z = 1$

$2x + 6y + z = 6$
