SE - IV - ETRX - CBSGS
Applied Mathematics - IV
Nov - Dec 2015

30/11/15

QP Code : 5350

Duration: 3 Hours (REVISED COURSE) Total marks assigned to the paper:80

N.B:1) Q 1 is compulsory.

2) Attempt any three from the remaining.

Q 1: a) Find the extremal of $\int_{x_1}^{x_2}(y^2 - y'^2 - 2ycoshx)dx$ (5)

b) Find an orthonormal basis for the subspaces of R^3 by applying Gram-Schmidt process where S={(1, 2,0)(0,3 1)} (5)

c) Show that eigen values of unitary matrix are of unit modulus. (5)

d) Evaluate $\int \frac{dz}{z^3(z+4)}$ *where* $|z| = 4$. (5)

Q2: a) Find the complete solution of $\int_{x_0}^{x_1}(2xy - y'^2)\,dx$ (6)

(b) Find the Eigen value and Eigen vectors of the matrix A^3 where $A = \begin{bmatrix} 4 & 6 & 6 \\ 1 & 3 & 2 \\ -1 & -5 & -2 \end{bmatrix}$ (6)

(c) Find expansion of $f(z) = \frac{1}{(1+z^2)(z+2)}$ indicating region of convergence. (8)

Q3: a) Verify Cayley Hamilton Theorem and find the value of A^{64} for the matrix A=$\begin{bmatrix} 1 & 2 \\ 2 & -1 \end{bmatrix}$. (6)

b) Using Cauchy's Residue Theorem evaluate $\int_{-\infty}^{\infty} \frac{x^2}{x^6+1}dx$ (6)

c) Show that a closed curve 'C' of given fixed length (perimeter) which encloses maximum area is a circle. (8)

Q4: a) State and prove Cauchy-Schwartz inequality. Verify the inequality for vectors $u = (-4,2,1)$ *and* $v = (8,-4,-2)$ (6)

b) Reduce the Quadratic form $xy + yz + zx$ to diagonal form through congruent transformation.(6)

c) If $A = \begin{bmatrix} \frac{3}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{3}{2} \end{bmatrix}$ then find e^A *and* 4^A with the help of Modal matrix. (8)

Q5: a) Solve the boundary value problem $\int_0^1(2xy + y^2 - y'^2)\,dx$, $0 \le x \le 1$, $y(0) = 0, y(1) = 0$ by Rayleigh - Ritz Method. (6)

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b) If $W = \{\propto: \propto \in R^n \text{ and } a_1 \geq 0\}$ a subset of $V = R^n$ with $\propto = (a_1, a_2 \dots \dots \dots a_n)$ in R^n (n≥3). Show that W is not a subspace of V by giving suitable counter example. (6)

c) Show that the matrix $A = \begin{bmatrix} 8 & -8 & -2 \\ 4 & -3 & -2 \\ 3 & -4 & 1 \end{bmatrix}$ is similar to diagonal matrix. Find the diagonalsing matrix and diagonal form. (8)

Q6: a) State and prove Cauchy's Integral Formula for the simply connected region and hence evaluate

$$\int \frac{z+6}{z^2-4} dz, \quad |z-2| = 5$$ (6)

b) Show that $\int_0^{2\pi} \frac{\sin^2\theta}{a+b\cos\theta} d\theta = \frac{2\pi}{b^2}\left(a - \sqrt{a^2-b^2}\right), \ 0 < b < a.$ (6)

c) Find the Singular value decomposition of the following matrix $A = \begin{bmatrix} 1 & 2 \\ 1 & 2 \end{bmatrix}$ (8)

SE - IV - ETRX - CBSGS. 17/12/15

Fundamentals of Communication Engineering.

Dec-2015

5482

QP Code :

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

N.B. : (1) Question No. 1 is compulsory.
(2) Solve any **three** questions from remaining **five** questions.
(3) Assume **suitable data** if **necessary**.

1. Give brief answers to any **four** :— **20**
   (a) What is delta modulation ?
   (b) Define the terms signal to noise ratio, noise temperature and noise figure.
   (c) What is need of modulation ?
   (d) State and explain sampling theorem.
   (e) Write advantages of SSB modulation.

2. (a) Explain Ring modulator. **10**
   (b) An Am broadcast station has modulation index which is 0·75 on the average. What would be its average power saving, if it could go over to single sideband suppressed carrier transmissions, while having to maintain the same signal strength in its reception area. **10**

3. (a) Write note on carson rule and explain working of superhetrodyne AM receiver. **10**
   (b) Explain the Armstrong frequency modulation system with the help of block diagram. **10**

4. (a) With respect to radio receiver. Explain :— **10**
   (i) Sensitivity (iii) Image frequency
   (ii) Selectivity (iv) Double spotting
   (b) Explain superhetrodyne radio receiver. **10**

5. (a) Compare PAM, PWM and PPM. **10**
   (b) Explain what is meant by quantisation noise and comment on Adaptive delta modulation. **10**

6. Write short notes on any **four** :— **20**
   (a) Pre-emphasis and de-emphasis
   (b) Time Division multiplexing
   (c) Pulse code modulation
   (d) Electromagentic spectrum
   (e) AGC

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S.E- IV - ETRX - CBSGS.

10/12/15

Principles of Control Systems.

Dec - 2015

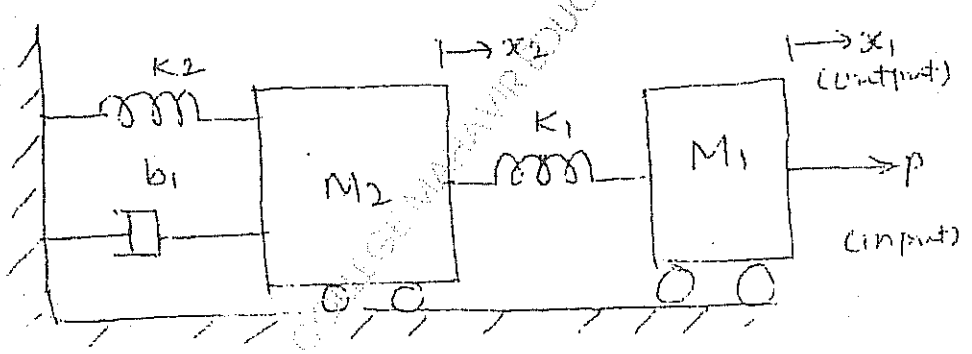
Q.P. Code : 5440

(3 Hours) [Total Marks :80

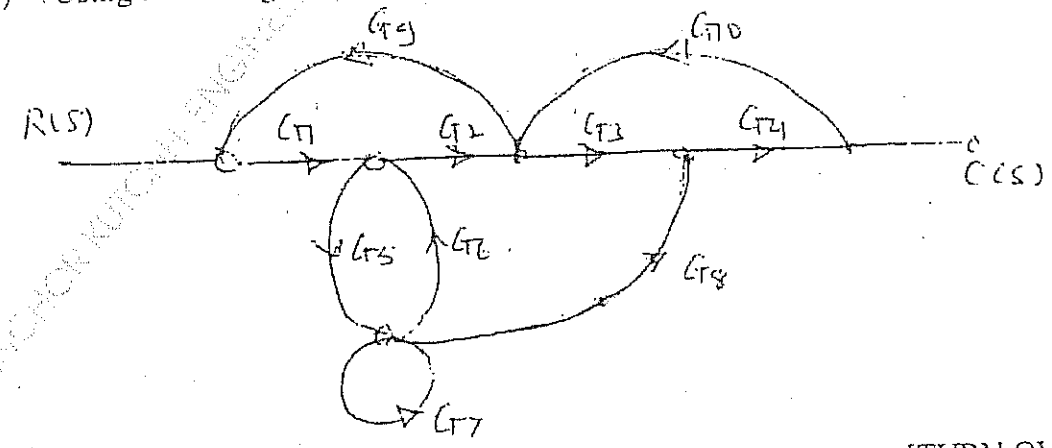
N.B. : (1) Question No.1 is compulsory
(2) Attempt any three questions from remaining five questions
(3) Assume suitable data if necessary.
(4) Figure to the right indicate full marks

1. Answer the following. 20
   (a) Define relative and absolute stability. State its significance.
   (b) Derive relationship between time and frequency domain specification of system.
   (c) Differentiate open and closed loop system
   (d) Explain different types of models used in applications

2. (a) Obtain the transfer function of the following mechanical system. 10



(b) Using Mason's gain formula, find C(s)/R(s) 10



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3. (a) Construct root locus for the following transfer function. Find range of K for system to be stable $G(s)H(s)=\frac{K(S+13)}{S(S+3)(S+8)}$ 10

(b) Check controllability and observability for the system 10

$$\dot{x}=\begin{bmatrix}1 & 2 & 1\\ 0 & 1 & 3\\ 1 & 1 & 1\end{bmatrix}x+\begin{bmatrix}1\\ 2\\ 0\end{bmatrix}u$$

$$y=\begin{bmatrix}1 & 3 & 1\end{bmatrix}x$$

4. (a) Sketch the bode plot for the system described by following transfer function. Also comment on stability $G(s)H(s)=\frac{0.4(1+6S)}{S^2(1+0.5S)}$ 10

(b) Find the solution of following state equation $\dot{x}=\begin{bmatrix}-5 & -6\\ 1 & 0\end{bmatrix}x+\begin{bmatrix}1\\ 0\end{bmatrix}u$ 10

$$y=\begin{bmatrix}1 & 1\end{bmatrix}x$$

5. (a) State and prove properties of state transition matrix. 7

(b) The characteristics equations for certain feedback systems are given below. Determine range of k for the system to be stable 8

(i) $S^4+20KS^3+5S^2+10S+15=0$

(ii) $S^3+2KS^2+(K+2)S+4=0$

(c) Explain what is robust control system. Also explain the need of robust control. 5

6. (a) Explain the effects of P, I and D actions. 6

(b) Explain the effect of addition off poles and zeros to the system. 7

(c) Explain different time domain specifications. 7

SE - IV - ETRX - CBSGS.
Microprocessor and Peripherals.
Nov-Dec 2015

04/12/15

QP Code : 5398

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

N.B. : 1.Question no. 1 is compulsory
2. Solve any three from the remaining five questions.
3. Assume suitable additional data if necessary.

Q1	a)	Explain interrupts of 8085	5
	b)	Compare min-mode with max-mode of 8086.	5
	c)	Write an 8086 assembly language program to divide 16 bit number by 4 bit number	5
	d)	Explain System bus arbitration in Loosely Coupled System	5
Q2	a)	What is DMA. Explain 8237DMAC	10
	b)	What is segmentation? Give usages, advantages of segmentation	5
	c)	Compare 8085,8086 and 8088 microprocessors.	5
Q3	a)	Design 8086 based system for following specifications: 8086 operating at 3 MHz; 6KByte of EPROM, 3KByte of ROM; 2 i/o ports.	15
	b)	Explain interrupt acknowledge (INTA) cycle of 8086	5
Q4	a)	Explain parameter passing methods in 8086	10
	b)	Write an 8086 assembly language program to divide to divide 32 bit number by 8 bit number	5
	c)	What is instruction pipelining? Give advantages and challenges associated with it.	5
Q5	a)	Explain interfacing of 8259 with 8086 (Cascade mode)	10
	b)	Explain Closely Coupled System (CCS)	5
	c)	Write short notes on assembler directives	5
Q6	a)	Give applications of interrupts. Explain interrupts of 8086	7
	b)	Explain low-speed (slow) peripheral (memory) interface with 8086 with wait states with the help of timing diagram.	7
	c)	Explain 8087 math co-processor and its usages	6
