Subject Code: G4507/R13

M. Tech –I Semester Regular/ Supply Examinations, February, 2016

EMBEDDED REAL TIME OPERATING SYSTEMS/
EMBEDDED AND REAL TIME SYSTEMS
(Common to DS&CE, ES, S&SP, DIP, CE&SP, C&SP and SP&C)

Time: 3 Hours **Max Marks: 60**

Answer any FIVE questions
All questions carry EQUAL marks

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1. a) Explain the goals of services.
   b) Explain the memory management in RTOS.

2. a) Discuss OS security issues.
   b) List the basic design principles in RTOS.

3. a) Explain the types of RTOS programming.
   b) Explain the system level functions of mCOS-II in RTOS.

4. a) Explain the basic features of RTOS VxWorks.
   b) List the windows CE features in RTOS.

5. a) Draw the basic system of ACVM and explain the system specifications in detail.
   b) Draw and explain the class diagram of TCP-stack.

6. a) Draw and explain ACC Hardware Architecture.
   b) Discuss operating system software.

7. a) Write note on process commands.
   b) Write a program illustrates the use of fork () function call.

8. a) Explain the use of Semaphore and write the program.
   b) What is an RTLinux module? Explain.

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Subject Code: G5612/R13

M. Tech –I Semester Regular/ Supply Examinations, February, 2016

GENERATION & MEASUREMENT OF HIGH VOLTAGES

(Common to HVE, HVPS, PS, PSC&A, EPE, EPS and APS)

Time: 3 Hours **Max Marks: 60**

Answer any FIVE questions

All questions carry EQUAL marks

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1. (a) Explain with neat diagrams the procedure to control electric field intensity in high voltage equipment.
   (b) Starting with Laplace's equation in two dimension explain the Finite Difference Method for Evaluation of field distribution. Discuss its advantages and disadvantages.

2. (a) Explain the principle of operation of electrostatic generators with a neat diagram.
   (b) Derive an expression for ripple voltage of a multistage Cockcroft-Walton Circuit.

3. (a) Define ripple voltage. Show that the ripple voltage in a rectifier circuit depends upon the load current and the circuit parameters.
   (b) Explain the series-parallel resonant circuit and discuss its advantages and disadvantages.

4. (a) Draw a typical impulse current generator circuit and explain its operation and application.
   (b) A ten-stage impulse generator has 0.250μF condensers. The wave front and wave tail resistances are 75 ohms and 2600 ohms respectively. If the load capacitance is 2.5 nF, determine the wave front and wave tail times of the impulse wave.

5. (a) An impulse generator has eight stages, each stage having a capacitor rated 0.16 μF; and 125 kV. The load capacitor is l nF. Find the values of the wave shaping resistors needed to generate a 1.2/50 μs lightning impulse wave. What is the maximum output voltage of the generator if the charging voltage is120kV? What is the energy rating of the generator?
   (b) Explain one method of controlled tripping of impulse generators. Why is controlled tripping necessary?

6. (a) Draw a neat schematic diagram of a generating voltmeter and explain its principle of operation. Discuss its application and limitations.
   (b) Discuss the different methods of measuring high DC voltages. What are the limitations in each method?

7. (a) Explain with neat diagram how rod gaps can be used for measurement of high voltages. Compare its performance with a sphere gap.

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7. (b) Give the schematic arrangement of an impulse potential divider with an oscilloscope connected for measuring impulse voltages. Explain the arrangement used to minimize errors.

8. (a) What are the problems associated with measurement of very high impulse voltages? Explain how these can be taken care of during measurements.
   (b) Draw Chubb-Fortescue Circuit for measurement of peak value of AC voltages discuss its advantages over other methods.

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Subject Code: G5614/R13

M. Tech –I Semester Regular/ Supply Examinations, February, 2016

MODERN CONTROL THEORY

(Common to PSC&A, EPE, EPS, PE, P&ID, PE&ED, PE&D, EM&D, PE&PS, and APS)

Time: 3 Hours **Max Marks: 60**

Answer any FIVE questions

All questions carry EQUAL marks

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1. a) Prove that similar matrices have the same characteristics polynomial and therefore the same eigen values?

   b) Find the eigen values and Jordan form representation for the following matrices?

$$\begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -2 & -4 & -3 \end{pmatrix}$$

2. a) Show that the solution to the homogenous state equation $\dot{X}(t) = AX(t)$ is unique

   b) The following facts are known about the linear system

$$\dot{X}(t) = AX(t)$$

If $x(0) = \begin{bmatrix} 1 \\ -2 \end{bmatrix}$, $then\ x(t) = \begin{bmatrix} e^{-2t} \\ -2e^{-2t} \end{bmatrix}$

f $x(0) = \begin{bmatrix} 1 \\ -1 \end{bmatrix}$, $then\ x(t) = \begin{bmatrix} e^{-t} \\ -e^{-t} \end{bmatrix}$ Find e^{At} and hence A.

3. a) Explain the general concept of observability? Explain the observability tests for continuous time invariant systems?

   b) Consider the system described by

$$\begin{pmatrix} \dot{x}_1 \\ \dot{x}_2 \end{pmatrix} = \begin{pmatrix} 0 & 1 \\ -4 & -1 \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \end{pmatrix} + \begin{pmatrix} 1 \\ 1 \end{pmatrix} u$$

$$Y = (1 \quad 0) \begin{pmatrix} x_1 \\ x_2 \end{pmatrix}$$

   Is this system is controllable and observable?

4. The block diagram of a system with hysteresis is shown in Figure.1 Using describing function method, determine whether limit cycle exists in the system. If limit cycles exists, determine their amplitude and frequency.

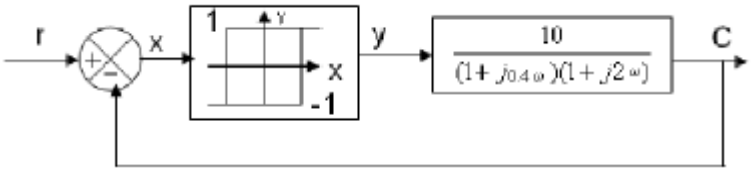

Figure.1

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5. Linear second order servo is described by the equation $\ddot{e} + 2r\omega_n\dot{e} + \omega_n^2 e = 0$ where τ=0.15, ω_n= 1 rad/sec e(0)=1.5 and $\dot{e}(0)$ = 0. Determine the singular point. Construct the phase trajectory, using the method of isoclines.

6. a) Explain the stability analysis of the linear continuous time invariant systems by Lyapunov second method.
   b) Illustrate the generation of Lyapunov function by Krasooviski's method?

7. a) Define the state observer? Deduce the expression for reduced order observer?
   b) Consider the system defined by:

$$\dot{X} = \begin{pmatrix} 0 & 1 \\ -1 & 2 \end{pmatrix} X + \begin{pmatrix} 1 \\ 1 \end{pmatrix} u$$

   Show that this system cannot be stabilized by the state feedback control μ = –kx whatever matrix k is chosen.

8. Suppose that the system

$$\dot{x}_1(t) = x_2(t)$$
$$\dot{x}_2(t) = u(t)$$

   is to be controlled to minimize the performance measure

$$J(x,u) = \frac{1}{2}\int_0^2 u^2 dt$$

   Find a set of necessary conditions for solving optimal control using Hamiltonian formula of variational calculus.

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Subject Code: G6805/R13

M. Tech –I Semester Regular/ Supply Examinations, February, 2016

HARDWARE SOFTWARE CO-DESIGN

(Common to VLSI & ES, ES & VLSI, VLSID & ES, ES & VLSID, VLSI, VLSID, VLSISD, VLSI&ME,)

Time: 3 Hours **Max Marks: 60**

Answer any FIVE questions

All questions carry EQUAL marks

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1	a	What is meant by Co-design. Explain about the different types of co-design models	[6]
	b	Discuss about the generic co-design methodology	[6]
2	a	Differentiate prototyping and Emulution techniques	[6]
	b	Explain about the Architecture for data dominated systems TMS320C60	[6]
3	a	What are the Embedded software development needs, explain in detail	[6]
	b	Define compilation, Explain about different types of Compilation technologies	[6]
4	a	Explain about the co-design computational model	[6]
	b	Distinguish between design verification and implementation verification	[6]
5	a	Comare the languages of system-level specification for Design -I and Design-II systems	[6]
	b	Explain the differences between the cosyma system and lycos system	[6]
6	a	Explain about the different Languages used for Hardware software co-design systems	[6]
	b	Explain the Hardware-Software partitioning distributed systems co-synthesis	[6]
7	a	Explain about the future developments in emulation and prototyping architectures specialization techniques	[6]
	b	Define Mixed system, Discuss about Mixed systems with suitable example	[6]
8	a	Write a short notes on a. interface verification b. implementation verification c. VLSI &ES	[3*4=12]

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Subject Code: G8205/R13

M. Tech –I Semester Regular/ Supply Examinations, February, 2016

DETECTION & ESTIMATION THEORY

(Common to DE&CS, E&CE, CS, M&CE and DECE)

Time: 3 Hours **Max Marks: 60**

Answer any FIVE questions

All questions carry EQUAL marks

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1. a) Derive the likelihood ratio test (LRT), under the Neyman Pearson (NP) criterion for a binary hypothesis problem.
   b) When does the LRT test under minimum probability of error criterion become identical to that under NP criterion?

2. a) List out any four properties of receiver operating characteristics for simple binary hypothesis tests
   b) Show that the M-ary hypothesis test can be reduced to a set of LRT tests with likelihood functions defined corresponding to all of the M hypotheses.

3. a) With neat sketch Explain Kalman Filters
   b) What are the applications of Kalman Filters?

4. What is the significance of Linear Minimum Mean Squared Error Estimators? With neat sketch Explain Linear Minimum Mean Squared Error Estimators

5. a) List the properties of Probability Distribution Functions
   b) Discuss about Nonparametric Estimators of Probability Distribution Functions

6. a) Explain the differences between Model-free Estimation and Model-based Estimation of Autocorrelation Functions
   b) Define Wide Sense Stationary and Strict Sense Stationary Random Processes. Explain the Tests for Stationary.

7. Discuss the Bayesian approach to estimation. What are the typical risk functions used? Show that use of the absolute error cost function leads to the median of the posterior density function $p((\theta|x))$ as the optimal estimate of θ

8. Write Short notes on
   a) Simple Linear Regression
   b) Markov Sequences and Processes

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