

**III B.Tech. II Semester Supplementary Examinations,
November/December -2005**

**ROBOTICS AND EMBEDDED SYSTEMS
(Instrumentation & Control Engineering)**

Time: 3 hours**Max Marks: 80**

**Answer any FIVE Questions
All Questions carry equal marks**

1. (a) Define and explain the following terms:
 - i. Degree of freedom
 - ii. Workspace.
- (b) Describe the applications of robots in the following fields:
 - i. Material handling
 - ii. Welding [6+10]
2. (a) What is manipulator? With the help of neat sketches explain hydraulic manipulator.
- (b) Enumerate the differences between mechanical manipulators and pneumatic manipulators. [10+6]
3. What is the function of the gripper? Discuss the different types of grippers. [16]
4. (a) What is an embedded computer system? What are its applications.
- (b) Explain the characteristics of Embedded computers algorithms. [6+10]
5. (a) Code the operations $y=(a<2):(b\&15)$ using SHARC instructions.
- (b) Compare and contrast ARM and SHARC processors. [6+10]
6. (a) What is an interrupt? What are various interrupts supported by SHARC processor? What are steps performed by it to an interrupt?
- (b) Briefly explain about input and output devices. [6+10]
7. (a) Draw a timing diagram for a burst write operation that writes four locations.
- (b) Explain the bus configuration with DMA controller. [6+10]
8. (a) Write a CDFG for a 'for' loop.
- (b) For a given ARM code, develop a symbol Table.

	ORG	100
Label 1	ADR	r4,c
	LDR	r0,[r4]
Label 2	ADR	r4,d
	LDR	r1,[r4]
Label 3	SUB	r0,r0,r1

[6+10]

**III B.Tech. II Semester Supplementary Examinations,
November/December -2005**

**ROBOTICS AND EMBEDDED SYSTEMS
(Instrumentation & Control Engineering)**

Time: 3 hours

Max Marks: 80

**Answer any FIVE Questions
All Questions carry equal marks**

1. (a) Discuss the different types of robot configurations.
(b) Explain the advantages of using robots in hazardous places. [10+6]
2. (a) What are the different types of servomotors? Briefly explain them.
(b) Differentiate between range and proximity sensors. [12+4]
3. (a) Discuss the different techniques used in robot vision.
(b) Describe the working of pneumatic manipulator with the help of neat sketch. [8+8]
4. (a) What are various steps in the design process of embedded system? Explain with flow chart.
(b) List out different functional / non-functional requirements in the design of embedded system. Explain them briefly. [6+10]
5. Design the programming model of SHARC processor with ALU operations. [16]
6. Explain the procedure for address translation for
(a) a segment and
(b) page

What are the other schemes for organizing page tables. [16]

7. (a) Draw a timing diagram for a write operation with no wait states.
(b) Explain the bus configuration with DMA controller. [6+10]
8. (a) Explain about CDFG model with an example.
(b) For a given ARM code, develop a symbol Table.

```

                ORG    100
Label 1  ADR    r4,c
                LDR    r0,[r4]
Label 2  ADR    r4,d
                LDR    r1,[r4]
Label 3  SUB    r0,r0,r1

```

[6+10]

**III B.Tech. II Semester Supplementary Examinations,
November/December -2005
ROBOTICS AND EMBEDDED SYSTEMS
(Instrumentation & Control Engineering)**

Time: 3 hours

Max Marks: 80

**Answer any FIVE Questions
All Questions carry equal marks**

1. Explain the use of robots in the following applications:
 - (a) Loading and Unloading
 - (b) Painting
 - (c) Assembling
 - (d) Processing [4×4]
2. Describe the following proximity sensors used in robots:
 - (a) Inductive sensors
 - (b) Capacitive sensors
 - (c) Ultrasonic sensors [5+5+6]
3.
 - (a) Explain the characteristics of robot languages.
 - (b) Enumerate the differences between mechanical, hydraulic and pneumatic manipulators. [8+8]
4.
 - (a) Explain clearly about Von Neumann and Harvard architectures with the help of block diagram.
 - (b) What are various applications of embedded systems? Explain briefly [6+10]
5.
 - (a) Write ARM assembly code to implement the given C assignment $y=(a<2):(b\&15)$
 - (b) Compare and contrast ARM and SHARC processors. [6+10]
6.
 - (a) What are the interrupts supported by ARM processors? How it responds to an interrupt? Explain.
 - (b) Distinguish between maskable and non-maskable interrupts? [6+10]
7.
 - (a) Draw a timing diagram for a read operation on a bus in which the read includes two wait states.
 - (b) Explain the bus configuration with DMA controller. [6+10]
8.
 - (a) Write a CDFG for a while loop.

(b) For a given ARM code, develop a symbol Table.

	ORG	100
Label 1	ADR	r4,c
	LDR	r0,[r4]
Label 2	ADR	r4,d
	LDR	r1,[r4]
Label 3	SUB	r0,r0,r1

[6+10]

★ ★ ★ ★ ★

**III B.Tech. II Semester Supplementary Examinations,
November/December -2005
ROBOTICS AND EMBEDDED SYSTEMS
(Instrumentation & Control Engineering)**

Time: 3 hours

Max Marks: 80

**Answer any FIVE Questions
All Questions carry equal marks**

1. (a) Define 'degree of freedom'. Discuss the different degrees of freedom used in robots.
(b) Discuss the important applications of robots in the manufacturing industries. [6+10]
2. (a) Explain the following optical encodes:
 i. Incremental Optical Encoder
 ii. Absolute Optical Encoder
(b) What is the purpose of actuator used in robots? Discuss the cylinder and piston type of actuator. [8+8]
3. (a) What are the uses of sensors in robots?
(b) Discuss the different types of range sensors.
(c) Describe the linear position measuring transducers used in robots. [4+6+6]
4. (a) Briefly describe the distinction between requirements and specifications in the design of embedded systems.
(b) What are the problems that must be considered in the design of embedded systems. [6+10]
5. Describe the programming model of an ARM processor, with various data formats, and instructions. [16]
6. (a) Write notes on
 i. Supervisor mode
 ii. Exceptions and
 iii. traps.
(b) Explain about direct-mapped cache organization with a block diagram. [6+10]
7. (a) Draw a timing diagram for a write operation on a bus in which the write takes two wait states.
(b) Explain the bus configuration with DMA controllers. [6+10]
8. (a) What are the functions of assembler and linker?

(b) For a given ARM code, develop a symbol Table.

	ORG	100
Label 1	ADR	r4,c
	LDR	r0,[r4]
Label 2	ADR	r4,d
	LDR	r1,[r4]
Label 3	SUB	r0,r0,r1

[6+10]

★ ★ ★ ★ ★