

College of Engineering, Pune
M Tech First Year – Instrumentation & Control
IE 512 – Batch Process Control

Academic Year: 2011- 12

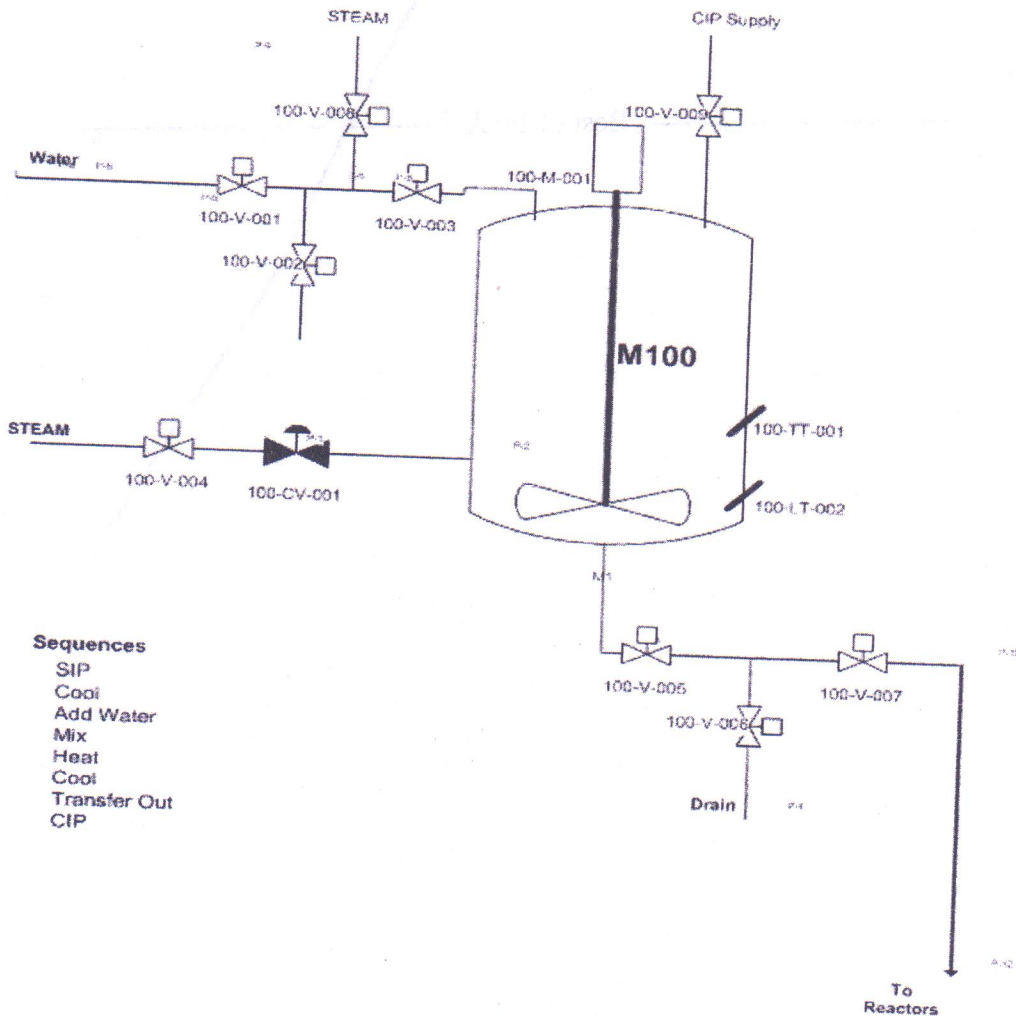
Timing: 3 hrs
 Max. Marks: 50

End Semester Examination

Instructions:

1. All Questions are compulsory & carry equal Marks
2. Assume suitable data
3. Draw neat diagrams wherever necessary
4. Use of non programmable calculators are allowed

1. Develop 'Running', 'Holding', 'Aborting' and 'Restarting' sequences with required steps, actions and transitions and Procedural model according to S88 for the given sequence.



2. List the guide lines to design operator console and discuss the significance of each. If the same type of console is to be designed for Engineers' interface, state the extra features are needed.
3. After completion of Top-down design, what are different types of requirements to be stated or noted for batch control system ? How the functional specifications are designed with respect to process information, system requirements and project management.
4. Discuss about Reliability and availability of batch control system. Explain the reliability Curve.
5. Classify different types of recipes for batch processes. Discuss the detailing of the different types of recipes and the recipe structure.

-----Best of Luck -----

End-Semester Examination
(BI- 512) Ultrasonic Applications in Bioengineering

Programme: **M.Tech (Instrumentation and Control)**

Specialisation: **Biomedical Instrumentation**

Year: 2011-12

Duration: 3 hrs

Date: 7/5/2012

Semester: II

Max. Marks: 50

Instructions:

1. All questions are compulsory
2. Assume suitable data if necessary
3. Figures to right indicate full marks
4. Draw neat figures wherever required
5. Use of non-programmable calculator is allowed

- Q. 1 A disc transducer of radius "a" transmits waves toward a target at distance R from the center of the transducer and at offset distance d from the beam axis. The speed of sound is C and the target is at the far-field zone, as shown in figure 1.
- (a)

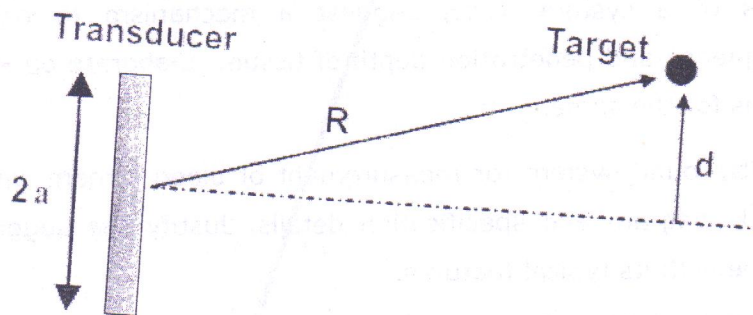


Figure 1

Calculate the required maximum frequency in order to obtain an echo from that target (side lobes can be ignored). Elaborate the necessary assumptions for calculations. 05

- Q. 1 It is required to measure the diameter of the heart's left ventricular cavity using A - mode. After transmitting a pulse, four echoes were obtained at times t_1 , t_2 , t_3 , and t_4 as shown in figure 2. The average speed of sound is C. How will you measure the diameter in terms of given parameters? Elaborate the necessary assumptions for calculations.
- (b)

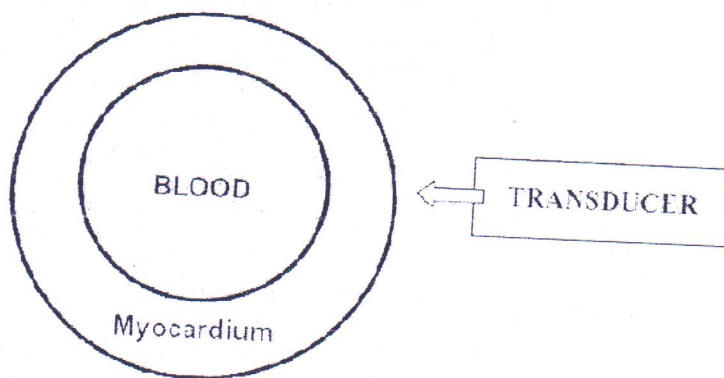


Figure 2

- Q. 1 In an ultrasonic treatment of an organ, a temperature elevation of 3°C was measured in the treated tissue. The blood flow to that organ was temporarily stopped and a temperature elevation of 4°C was measured. Determine the ratio between the allowed transmission duration before and after stopping the blood. Elaborate the assumptions. 05
- (c) 05
- Q. 2 It is required to apply ultrasound frequency to reduce inflammation, swelling and calcium deposits in a human body. Write down design specifications of a system. Also, suggest a mechanism to balance between frequency and penetration depth of tissue. Elaborate on safety considerations for the same. 10
- Q.3 Design an ultrasound system for measurement of blood stream with its detailed block diagram and specification details. Justify the suggested design scheme with its typical features. 10
- Q.4 It is required to apply ultrasound frequencies for cardiac movement applications such as measurement of muscle thickness, cardiac valve movement. Suggest the suitable mode for the following applications with its typical characteristics, and required instrumentation :
- i. 2-D image
 - ii. real time/ 3-D image
- 15
-

Total No. of Questions: 5

Total No. of Pages: 3

COLLEGE OF ENGINEERING, PUNE
(An Autonomous Institute of Govt. of Maharashtra)

END SEM. EXAM.

M.Tech-I (Biomedical Instrumentation)

BI-502 Embedded Systems

Year: 2011-12

Time: 3 hours

Max Marks: 50

Instructions to candidates:

1. Neat diagram must be drawn wherever necessary
 2. Assume suitable data if necessary
 3. Figures to the right indicate full marks
 4. Use of only non programmable calculator is allowed
 5. Start answers of each question on new page.
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Q.1 Solve all

- A. The DC motor drive requires an input of 1V to 10V linearly to control speed of Motor from 500 rpm to 1800 rpm. Design a Microcontroller based system and draws a logical diagram with programming flow chart to obtain 1V to 10V linear output depends on input coming from speed sensor. **05**
- B. It is required to transfer the sensor readings (temp. readings) to PC, device a microcontroller based set-up for the same. Draw a logic diagram with programming flow chart. **04**

Q. 2 Solve all

- A Explain ARM Architecture in detail. What is MMU. Explain the need and role of MMU in POSIX based systems. **05**
- B What are tool chains? List various components of a tool chain. Explain each of them briefly. **05**

Q.3 An embedded system firm in Pune is designing a low-cost ARM based wireless router. They have hired you as a consultant for developing and designing the software for the product. Answer the following questions with proper reasoning and diagrams wherever necessary.

1. Which OS would you advice for the system and why? 02
2. Draw a diagram showing the layered architecture of the system's OS 03
3. Explain how the system's boot process will be - right from powering ON the device with supporting diagrams 02
4. The firm has provided with a default configuration file with the hardware for you to build the kernel. Write steps/commands to : 03
 - A. Configure the kernel with the given file (s3c2410_defconfig)
 - B. Disable the audio driver from the configuration
 - C. Compile the kernel using the cross-compiler (arm-linux-gcc)

Q.4 What is an API? Explain how libraries are helpful while developing an application. If you are developing a Digital camera and a key feature to be implemented is smile-detection, which library would you prefer using? (Give a generic example) 05

OR

A programmer is developing an industrial HMI to be used specifically in a power plant. He requires some widgets on the screen. The following table lists some display elements and their respective widgets to be used.

Display Element	Widget Type
Pressure Gauge	Dial
Temperature Gauge	Dial
Valve Status (ON/OFF)	Check Box
Panel ID and Name	Text

Decide upon some APIs for him for the above controls and explain how they will be called by a sample application and implemented in your own UI display library. Refer the following sample API declaration as an example to model your own APIs: 05

Panel ID and Name: `showText(int xPosition, int yPosition, int size, char * displayText)`

Q. 5 Solve any four

- A. Explain different architectures of FPGA's with respect to arrangement of CLB's and Slices **04**

- B. Write a Verilog/VHDL program for decimal synchronous up counter using FPGA, and display the same on seven segment LED's **04**

- C. Explain the Advantage and disadvantage of ASICs based developments and FPGA based developments **04**

- D. Define: Hardware Accelerators.
What are different coupling approaches of reconfigurable hardware? Draw neat block diagram of each. **04**

- E. For development of hardware accelerator of complex mathematical algorithm, it is required to profile using PC to know percentage time spend on each step involved. Draw a block diagram of hardware/software co-design methodology to accomplish the development. Explain the different parameters of reconfigurable design to be considered for performance analysis. **04**
