KATHMANDU UNIVERSITY
End Semester Examination [C]
November, 2017

Marks Obtained:

Level : B.E.
Year : IV
Course : COEG 402
Semester : II
Exam Roll No. :
Time: 30 mins.
F. M. : 10
Registration No.:
Date NOV : 1 5 2017

SECTION "A"
[20 Q. × 0.5 = 10 marks]

Tick the most appropriate answer.

1. Sudden change of control input due to change from Manual to Automatic mode is caused in _____ controller.
   a. P b. PD c. PI d. all the above

2. In Multibus II (ANSI/IEEE 1296)
   a. MPC is used
   b. BR line are wired OR
   c. BG line are daisy chained
   d. all the above

3. Ergonomics deals with _____.
   a. Discretized PID algorithm
   b. Psychological consideration in MMI
   c. Control algorithm in MMI
   d. SCADA

4. Which of the following is *not true* for operating system operation procedure?
   a. In multitasking environment with one processor, more than one task can be running in CPU
   b. In Static Priority allocation, the low priority tasks may not execute at all.
   c. Shared resources are accessed in Critical Region of the code.
   d. Rendezvous can be used for Inter Process Communication.

5. Bus arbitration can be done by _____.
   a. Bus master
   b. Message passing coprocessor
   c. Request to bus master
   d. all the above

6. Which of the following is applicable for very high temperature industrial processes?
   a. RTDs
   b. Thermistor
   c. Solid state temperature sensor
   d. Thermocouple

7. Linux is _____ of RT Linux.
   a. the core kernel b. the task scheduler c. an ideal thread d. not a part

8. Hysteresis controller is _____.
   a. Real time controller
   b. ON/OFF controller
   c. Feedforward controller
   d. PID controller

9. Which of the following actuator can operate in open loop?
   a. DC motor b. AC motor c. Linear motor d. Stepper motor

10. Decide whether each of the following answer is true (T) or false (F). A R-2R network DAC has:
    i. faster conversation time than weighted summing amplifier based DAC
    ii. higher conversion accuracy foranalog signal with wide range.
    a. (i)T (ii)T b. (i)T (ii)F c. (i)F (ii)T d. (i)F (ii)F

Fill in the blanks.

11. Inductive coupling can be eliminated by using _____.

12. The condition of several boards trying to be bus master at the same time, creating a conflicting situation, is called _____.

13. In case of more than one task waiting for semaphore task selection may be done by _____.

14. When some or all processes in a system are halted waiting for something to happen, then the system is in _____.

15. In case of _____, CPU identifies the interrupt generated by polling.

16. _____ is the condition in an operating system when one or more processes still run but fail to make any progress.

17. DIN 41612 standard of plug in connector has _____ , _____, and _____ pins.

18. In analysis, engineers can build a _____model of the system as a hypothesis of how the system could work.

19. Combination of supervisory and DDC produces _____ computer based operation.

20. Input/output process in which each port is assigned with a unique memory address is termed as _____.

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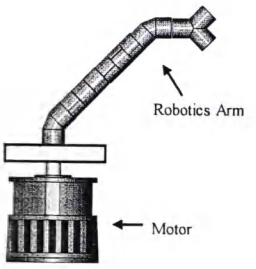
SECTION "B"

Attempt *ANY FIVE* questions. Assume missing parameters suitably. [*Question no 1 is compulsory*]

1. In a robotic arm as shown in figure, dc motor is used to control the position and speed.



Select appropriate sensor and write down flowchart using both conventional and real-time programming to control the robotic arm. [5]

Design PID controller for the system and write down computer program to implement the controller with sample time of 0.1 sec. [3]

2.
a) Write about integral windup and explain about its effect and method of eliminating it from computer based PID control system. [5]
b) Draw the block diagram and explain the working of hierarchical computer based operation. [3]

3.
a) Explain why interrupt is very important to implement Real Time Control System. Also explain different mechanism of handling interrupt in computer system. [4]
b) With an appropriate example write about SCADA system and explain the role of RTU in a SCADA system. [4]

4.
a) A dairy production plant consists of flash heating system, quality check, bottle filling and stock management unit. Construct a control system block diagram and write the control algorithm to control the whole system using DDC. [5]
b) Explain how synchronization of control loop can be achieved using ticks. [3]

5.
a) Explain with an appropriate example how inter process communication is achieved using rendezvous. [4]
b) Considering a practical control system, write about the importance of resource protection. Explain how resource can be protected using mutual exclusion. [4]

6. Write short notes on. (*ANY FOUR*)
a) History of implementing computer in industrial control. [2]
b) Block transfer and DMA. [2]
c) Optical proximity switches. [2]
d) RT Linux. [2]
e) Task state in an operating system. [2]