KATHMANDU UNIVERSITY
End Semester Examination
June/July, 2019

Level : B.E.
Year : IV
Time : 2 hrs 30 mins.

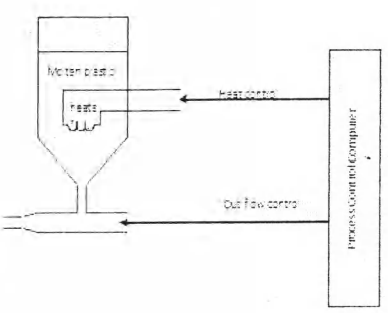
Course : COEG 402
Semester : II
F. M. : 40

SECTION "B"
[5Q × 8 = 40 marks]

Attempt *ANY FIVE* questions. Assume missing parameters suitably.

1. a. Write about cause and effect of integral windup. Also explain methods to eliminate it using appropriate algorithm/flowchart. [5]
   b. Explain with an appropriate example, how unprotected resource in an operating system can bring race condition. [3]

2. a. For an industrial process shown in figure, control objective is to heat the plastic to pre-defined temperature and extrude user defined volume of molten plastic. Volume of the plastic extruded should be controllable.
   Draw the complete block diagram of the system by selecting appropriate sensor, actuator and write down control algorithm to achieve control objective using both conventional and real time programming. [6]
   b. Write short note on real time operating system. [2]



3. a. Draw and explain different types of feed forward control structure and write about its benefits and limitation over feedback control. [3]
   b. Explain with an appropriate algorithm/program, how synchronization of control loop can be achieved using ticks. [4]
   c. Write short note on derivative kick. [1]

4. a. Draw explain basic block diagram of physical process and explain how digital computer can facilitate the process. [2]
   b. Draw and explain different types of bus interface electronics. Explain how data and address exchange can be achieved using tri-state logic. [4]
   c. Explain the importance of sample and hold in digital control system also explain problems associated with it. [2]

5. a. Consider any industrial process and explain how distributed digital control architecture can be implemented in your example to carry out the process. [5]
   b. Explain the working of digital ramp ADC. [3]

6. Write short notes on. (*ANY FOUR*) [4Q × 2 = 8]
   a. Adaptive control machining.
   b. Network layer of OSI model.
   c. MODBUS architecture and features.
   d. SCADA.
   e. Comparison between data acquisition system and direct digital control.
   f. RTU.

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Marks Scored:

Level : B.E.
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Exam Roll No. :
Time: 30 mins.
F. M. : 10

Registration No.:
Date :

SECTION "A"
[20 Q × 0.5 = 10 marks]

Tick the most appropriate answer.

1. Which of the following is not the field bus network topology?
[A] Branch [B] Ring [C] Star [D] Cyclic

2. Switching system with a hysteresis band is an example of _____.
[A] linear system [B] stochastic system
[C] non-linear system [D] fuzzy system

3. The mode of optical proximity switch with highest range of sensing is _____.
[A] specular reflection mode. [B] retroreflective mode.
[C] opposed mode. [D] diffuse reflection mode.

4. In terms of man machine interface, the concept of relating the operation of known object with similar operation is termed as _____.
[A] relativity [B] observability [C] visibility [D] controllability

5. Board which intends to become bus master sends request to bus arbiter via _____.
[A] bus request line [B] control line
[C] bus allocation line [D] master allocation line

6. Which of the following is not the criteria for classifying CNC machine?
[A] Axis of operation [B] Machining tool
[C] Machining speed [D] Control system

7. In real time control system _____.
[A] system never reaches deadlock condition.
[B] task priority is either fixed or determined by the operating system.
[C] multi-tasking is not possible.
[D] only event-based interrupts are used.

8. Which of the following is ***not true*** for actuator control of CNC machine?
[A] Only closed loop operation is possible.
[B] Both open and closed loop is possible.
[C] Stepper motor may be used for open loop operation.
[C] Demands encoder for each axis in closed loop operation.

9. In MultibusII interrupts are handled using _____.
[A] Multi master operation [B] Shared Interrupt
[C] Daisy-chain connection [D] Interrupt as unsolicited messages

10. Which of the following motion instruction G code corresponds to X-Y plane for arc machining in CNC machine?
[A] G12 [B] G13 [C] G17 [D] G18

11. A suspended task is equivalent to task being in _____ stage.
[A] pre protocol [B] post protocol [C] remainder I [D] remainder II

12. With reference to IEC 60204-1 standard which colour codes of pilot lights and push buttons indicates an abnormal situation likely to lead to a hazardous situation?
[A] Red [B] Green [C] Yellow [D] White

13. Decide whether each of the following answer is true (T) or false (F). A feed forward control system _____.
i. Can be used for sluggish system whose response time is very slow.
ii. Can be used for system with dynamic operating conditions.
[A] (i)T (ii)T [B] (i)T (ii)F [C] (i)F (ii)T [D] (i)F (ii)F

14. Decide whether each of the following answer is true (T) or false (F). Dead lock condition in an operating system _____.
i. is caused if a resource can be accessed only by a single process at a time.
ii. is caused if task have different priority in an operating system.
[A] (i)T (ii)T [B] (i)T (ii)F [C] (i)F (ii)T [D] (i)F (ii)F

15. Decide whether each of the following answer is true (T) or false (F). Integral windup can be eliminated by _____.
i. using integral control for large error only.
ii. limiting control signal by adjusting integral part.
[A] (i)T (ii)T [B] (i)T (ii)F [C] (i)F (ii)T [D] (i)F (ii)F

Fill in the blanks.

16. IEC 381 standard for current signal is_____.

17. Factory instrumentation protocol operates by means of a real-time capable _____ _____.

18. Due to abrupt change in setpoint or parameter variation the output of the system may jump abruptly. This phenomenon is termed as _____.

19. In a sample and hold circuit, some signal bleed through the switch to the capacitor. This phenomenon is termed as _____.

20. If a process can allocate the necessary resources one at a time, such method of resource allocation is termed as _____.