Two marks questions

1. **State the theoretical properties required for a digital control algorithm?**
   Open loop characteristics, reset problems, controller tuning, robustness, constraint handling, dead time compensation, working with right half plane.

2. **State deadbeat algorithm?**
   An algorithm that requires the closed loop response to have finite setting time, minimum rise time and zero steady state error is referred to as a dead beat algorithm.

3. **Give the advantages and disadvantages of dead beat algorithm?**
   Advantages
   Control specification is simple
   Disadvantage
   Existence of ringing.
   Closed loop response is likely to deviate from the specification due to inertia present in the industrial scale processing and modeling errors.

4. **state dahlin algorithm?**
   Dahlin's algorithm specifies that the closed loop sampled data control system behave as through it were a first order process with dead time.

5. **state closed loop specification for a dahlin algorithm?**
   The closed loo[specification is given by,
   $C(z)/r(Z) = f(Z) \cdot z\_(N+1)$
   F(Z) -> first order lag
   N -> number of sampling periods in the process in the process dead time.

6. give the disadvantages of dahlin algorithm?
   The only dis advantages of dahlin algorithm is it is unsuitable for process with inverse response due to the choice of N-(N+1)

7. **give the difference between position and velocity algorithm?**
   the difference between the position and velocity algorithm only computes the incremental output computes the incremental output instead of actual output of the controller.

8. **write the features of a digital PID controller**
   eliminate of reset windup.
   Eliminate of derivative kick.
   Effect of saturation on controller performances.
   Comparison of position and velocity algorithm.
   Time delay compensation.

9.explain ringing?
   When the roots of the denominator D(Z), transfer function contains a term whose coefficient is positive then it implies the presence of a pole of negative value, thus the controller ringing is caused.

10.how can ringing be avoided?

It can be eliminated by multiplying the transfer function with the ringing term and then multiplying the term to the denominator by applying a limit Z->1

11. state the conditions when a controller is said to be physically unrealiasable?

If the process contains a time delay then D(Z) will require future values of the error to determine the current values of controller value of controller output which is physically impossible when this occurs the controller is said to be physically unrelisable.

12. define robustness of a digital control algorithm?

The control algorithm must have the ability to maintain stability of the control system in the presence of a plant model mismatch

13. what is sampler and hold?

A sampler is used for the purpose od ADC it converts the continuous signal into a descrete signal of samples. A hold is similar to a DAC but the output is a continuous signal in pulsed form.

1.Define SCADA?

Supervisory Control And Data Acquisition system is computerized hardware and software based project that provides a single integrated view of all control and information resources, enable engineers, supervisors, managers, operators to view and interact with the working of an entire operation through graphical representation of their product process.

2.What is CIMPLICITY?

CIMPLICITY is a SCADA package. It is based on a client-server architecture consisting of servers and viewers. Servers are responsible for the collection and distribution of data. Viewers connect into servers and have full access to the collected data for viewing and control actions.

3.State the requirements of CIMPLICITY HMI plant edition?

CIMPLICITY HMI Plant Edition provides an extraordinary selection of features that enables to configure comprehensive and robust project. It gives a quick tour which provides links to the related subject in the documentation.

4.What is a DDC?

The DDC(Direct Digital Control) directly interface to the process for data acquisition and control purposes.

5.List the tasks performed by microprocessor in DDC?
- It reads the various variables from different transmitters through multiplexer and ADC.
- It determines the error for each control loop and executes control strategy for each loop.
- It outputs the correction value of control valve through DAC.

6.Mention the two algorithm used in DDC software?
There are two algorithms for programming a three mode PID control loop
   • Position algorithm
   • Velocity algorithm

7.Define AI?
Artificial Intelligence has been defined as the branch of computer science which deals with the software and hardware techniques to solve symbolic problems as against 'number crunching' problems solved by EDP machines.

8.What is heuristics?
The learned facts, experience and institution are three basic inputs which enable decision making collectively these are known as heuristics. In AI systems the decisions are taken on the basis of heuristics.

9.Mention the various categories under the AI system.
   • Natural language system
   • Perception system
   • Expert or knowledge based system

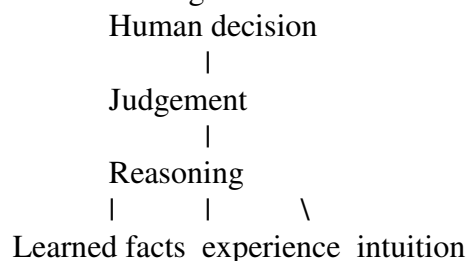10.List the various types of information presented to expert system.
The information presented to the expert system may be factual, incomplete, judgmental, speculative, experimental, uncertain, fuzzy and intuitive. Expert system should derive conclusions based on such incomplete information just like real life human expert.

11.What is domain knowledge?
The domain knowledge is stored in the knowledge base of system. The domain knowledge contains:
   • Facts
   • Relation between facts
   • Heuristics

12.Draw the flow diagram of Human Decision making process?

                Human decision
                      |
                Judgement
                      |
                Reasoning
                | | \
        Learned facts experience intuition

13.Differentiate the two reasoning mechanics.
Backward chaining:-stars with a goal i.e. conclusion which is most portable and then tries to go backward and match the left hand side of rule i.e. conditions.

Forward chaining:-is a top down approach. It proceeds in the direction until the goal i.e. conclusion is reached.

14.List the goals for an ideal expert controller.
Ability to control a large class of processes which may be time varying, non linear, with variety of disturbance.
Requirement of minimum prior knowledge about the process.
Ability to improve its performance with time, as it acquires more knowledge.

15.Differentiate between analog controller and digital controller.
Analog controller though are faster than digital controllers, the later is preferred because the changes in the parameters values are possible in digital controller while not in analog controller.

1.List three possible functions of a PLC programming device?
- Easy to use programming equipment is an important feature of the PLC.
- The programming device provides the primary mean by which the user
- Can communicate with the circuits of controller.
- The programming device allows the user to enter ,change,or monitor a PLC controller program

2.Explain the function of an optical isolator?
There are three main functions . They are
- Separate the higher ac input voltage from the logic circuits.
- Prevents damage to the processor due to line voltage transients.
- Helps top reduce the effect to electrical noise which can pass entire operation of the processor.

3.List the conditions for drawing the ladder logic ?
- Contacts may be always inserted in the upper left .
- Coils must be inserted at the end of a rung.
- All contacts must run horizontally (i.e)no vertically oriented contacts.
- The contacts must be nested .
- Flow must be from left to right.
- Contact progression should be straight across.

Rung scanning-Allen Bradley
Column scanning-Modern automation
4.List the sequence of operations carried out in PLC programming?
- Processor memory organisation
- Program scan
- PLC programming language

- Relay type instruction
- Instruction addressing
- Branch instruction
- Internal relay instruction
- Programming examine ON and OFF instructions
- Entering the ladder diagram.
- Modes of operation.

5.What is meant by program scan?

During each operating cycle the processor reads all the inputs,takes their values and according to the user program energies or de_energies the output .This process is known as program scan.

6.What is meant by PLC programming languages?

PLC programming languge refers to the method by which the user communicate information to PLC

7.List the relay type instructions?

Instruction set is composed of content symbols so the ladder diagram langue is also referred as contact symbology

1.EXAMINE ON instructions

2.EXAMINE OFF instruction

3.OUTPUT ENERGISE

8.What is meant by internal relay instructions?

Most PLCS have an area of memory allocated for what are known as internal storage bits .These storage bits are also called internal outputs ,internalcoils,internal control relays are just internals .The internaloutputs does not directly control an output device.

9.Explain EXAMINE ON and EXAMINE OFF instructions?

EXAMINE ON means :Normally open contact

EXAMINE OFF means :Normally close contact

10.List the modes of operations in plc?

There are 5 different modes of operations .They are

1. Connect PLC with PC
2. Clering the Ram
3. Store the logic in the Ram
4. Run
5. Continous until stop mode is selected.

11.Draw the ladder logic diagram for AND,NOR and EXOR gates?

12.What are the applications of PLC?

1. Sequence control,timing,counting,datacalculation.
2. Batch (or)continuous process control
3. Pricise position/motion control
4. Open loop or feedback control,process data acquisition and display