COLLEGE OF ENGINEERING, PUNE-5

(An Autonomous Institute of Govt. of Maharashtra)

END SEMESTER EXAMINATION

(IE 402) Industrial Automation

Programme: Final Year B. Tech (Instrumentation Engineering)

Year: 2012-13   Semester VII

Duration: 3 hrs   Max. Marks:50

Instructions:
1. Figures to right indicate full marks.
2. All Questions are compulsory.
3. Objective questions may have multiple answers.
4. Assume suitable data

SECTION-A

Objective Questions   **25**

1. Process Routing in Discrete Manufacturing does not contain the following:

    a) Operation sequence,

    b) Applicable work center,

    c) Product structure,

    d) Cycle time

2. The Cellular Manufacturing is preferred when

    a) Product configurations are similar

    b) Similar process sequence

    c) Mass manufacturing of a single product is required

    d) None of the above

3. Identify True or False. In a boiler feed water heater, steam used is from turbine.

    a) True

    b) False

4. Identify True or False. 'Turning gear' is used to increase the turbine speed.

    a) True

    b) False

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5. Level transmitters are used for measurement of oil, during custody transfer for oil & gas. What are most important characteristics required by such level transmitters
   a) Repeatability, Dead band
   b) Accuracy, Linearity
   c) Accuracy, Repeatability
   d) Hysteresis, Linearity

6. For the development of new protocol, Signal levels are decided as +/- 15 VDC. Identify the layer is specified with this.
   a) Transport Layer
   b) Data link Layer
   c) Physical Layer
   d) Network Layer

7. In HART protocol, digital data superimposed on the analog data. The peak to peak level of the superimposed AC signal is ------------
   a) 1 mA
   b) 2 mA
   c) 0.5 mA
   d) 4 mA

8. HART protocol uses Bell202 Frequency shift keying standards, why the analog values from transmitter do not interfere with AC digital value because –
   a) Both signals travels on different media
   b) Analog signal is transmitted first and then digital AS signal
   c) Average value of digital AC signal for the period is zero and 1 & 0 are identified by change in frequency.
   d) There is no modulation possible of Digital and Analog signals.

9. In distillation operation during PTA manufacturing, reflux ratio is function of

a) Temperature at top of column

b) Pressure at top of column

c) Composition of distillate

d) Feed temperature

10. As a safety interlock in turbine control, exhaust pressure control is achieved by monitoring –

a) Lubricating oil pressure and temperature

b) Rotor eccentricity

c) Rotor bearing temperature

d) Vacuum pressure trip

11. In continuous distillation, high reflux ratio of top product will result in

a) Low quality of bottom product

b) High product quality

c) Flooding in column

d) Low energy efficiency of column

12. In case of DCS audit trails are possible. It refers to

a) Records of what changes are done in system and by whom

b) parameter loggings

c) Consolidation of alarms

d) Alarm logging

13. For a Delta V System maximum node you can connect are

a) 120

b) 140

c) 100

d) 60

14. MODBUS Serial line RS485 is a low cost network using a master/slave

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medium access with a transmission speed

    a) from 1,200 to 115 bits/s.

    b) from 1,400 to 125 bits/s.

    c) from 1,200 to 115 Kbits/s.

    d) from 1,400 to 125 Kbits/s.

15. In Modbus RS485 maximum length of the bus is

    a) 1000m

    b) 100m

    c) 200m

    d) 2000m

16. Identify True or False. Switches provide the same function as a hub and additionally separate traffic to improve throughput.

    a) True

    b) False

17. In DeltaV system Sizing consist of

    a) 10 max. Professional Stations

    b) 59 max. Operator Stations

    c) 10 max. Application Stations

    d) 72 max. Remote Workstations

18. The DeltaV *Operate (Run)* is used by the operator to view and control the process. It consists of three items:

    a) Button Toolbar

    b) Diagnostics Toolbar

    c) Working Area

    d) Alarm Banner

19. DeltaV *Module* consists of the following

a) Hierarchy, Displays, Alarms

b) Conditionals, Algorithms, Module

c) Control system toolbar

d) All of the above

20. Fill in the blanks.

……………..State —Controller(s) are non-active members of a Control Network.

21. Suppose for controlling boiler a DCS system is used. Even then some standalone controllers are required for ------ systems

a) Pre-purge system

b) Loss of flame

c) Fan control systems.

d) drum level control

22. If the load on the boiler is increased, ------ are the manipulated variables will be affected.

a) Temperature of the steam

b) Feed water inlet flow

c) Air & fuel flows

d) pressure draft in combustion chamber.

23. Role of Manufacturing execution system is:

a) Business Planning & Logistics

b) Plant Production Scheduling

c) Operational Management,

d) Dispatching Production, Detailed Product

e) Scheduling, Reliability Assurance

24. Remove Odd words related with Close loop system

a) Protection and interlocking

b) Regulation

c) Logging and history recording

d) Process-driven sequential control

e) Sequential control

f) Data acquisition and pre-processing

g) Process optimization algorithms

25. Indentify the true statements from following

a) The cost of DCS is higher than PLC

b) DCS is usually supported from manufacturer.

c) Interface of DCS to ERP/MES/IT is difficult

d) In case of DCS On line configuration and programming is possible

SECTION-B

Descriptive Questions   25

1. Write a note on Field bus Communication.

2. What is the instrumentation used for production separators? In what way is it different from the instrumentation used for test separators and why?

3. List the ways through which you can control top composition in distillation column. Describe any one.

4. Select all the required hardware of PLC system for the following application. There are three ingredients from process line X, Y, Z for a reactor. Three mixers are required for mixing the three ingredients with a different speed.. After the process begins, mixer A is to start after 7 seconds elapse. Next, mixer B is to start 3.6 seconds after A. mixer C is to start 5 seconds after B. All then remain ON until a master enable switch is turned OFF. All three inlet valve remain ON for 5min to fill the reactor. The flow rate is fixed for all process lines. Alarm will be generated if flow rate is change. Draw a ladder diagram for the same.

5. Elaborate the meaning of Cold Restart.