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Name of the College (Please tick, symbol is given)	:	**COES**	✓	**CMES**		**COLS**	
Program/Course	:	**B. Tech EE**					
Semester	:	**VIII**					
Name of the Subject	:	**Industrial Automation**					
Subject Code	:	**IMGT 302**					
Name of Question Paper Setter	:	**Dr. Amit Kumar Mondal**					
Employee Code	:	**40000907**					
Mobile & Extension	:	**9557355689**					
Note: Please mention additional Stationery to be provided, during examination such as Table/Graph Sheet etc. else mention "NOT APPLICABLE":							

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Roll No: ----------

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, April, 2017

Program Name: B. Tech EE **Semester – VIII**
Course Name : Industrial Automation **Max. Marks : 100**
Course Code : IMGT 302 **Duration : 3 Hrs**
No. of page/s: 02

Note:
All questions are compulsory.
Assume data as per requirement.
Mention PLC's make, model, inputs and outputs.
Section A: 20 Marks
Section B: 10 X 4 = 40 Marks
Section C: 20 X 2 = 40 Marks

SECTION-A

1. Can the PLC and SCADA system be expanded, without re-engineering, to handle future requirements? [5]
2. Do we have to configure alarms for all items of hardware? [4]
3. Can we send alarms to a printer and file as well as display them on the screen? [2]
4. In derivative control action the output of the controller depends on the time rate of change of the actual errors. When the error is zero or a constant, the derivative controller output is zero…… [2]
5. Field output devices are connected to …….. module of PLC for interfacing purpose. [1]
6. Retentive timer retains the accumulated value and measures cumulative time period, during which rung condition is true. (True/ False) [1]
7. Zener diode is used in…..
   a) Rectifier
   b) Regulator
   c) Filter
   d) Line Conditioner
8. …….. shows the connection of input and output devices to PLC [1]
   a) Block diagram
   b) Wiring diagram
   c) Flow diagram
   d) System diagram
9. Selection of module depends on ….. [1]
   a) Power consumption
   b) Number of I/O devices connected
   c) Switching Speed
   d) Cost
   e) All of the above
10. In a PID controller, the offset has increased. The integral time constant has to be ___ so as to reduce offset: [1]

a) Reduced
b) Increased
c) Reduced to zero
d) None of the above

11. When derivative action is included in a proportional controller, the proportional band: [1]
    a) Increases
    b) Reduces
    c) Remains unchanged
    d) None of the above
12. In a proportional temperature controller, if the quantity under the heater increases the offset will: [1]
    a) Increase
    b) Reduce
    c) Remain uneffected
    d) None of the above

SECTION-B

13. How can we provide for data integrity and system control in the event of hardware failure?
14. How can we prioritize alarms?
15. Explain in brief concept of sinking and sourcing output module.
16. List the characteristic of PI control action.

SECTION-C

17. In process plants, to move the conveyors to and fro, forward and reverse motion of 3-phase Induction motors is require. Develop a PLC program to achieve so.
    Also, design its power circuit and control circuit diagram.

18. Develop a program that will latch on an output B 20 seconds after input A has been turned on. After A is pushed, there will be a 10 second delay until A can have any effect again. After A has been pushed 3 times, B will be turned off.

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Course Code : IMGT 302 **Duration : 3 Hrs**
No. of page/s: 03

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Section A: 20 Marks
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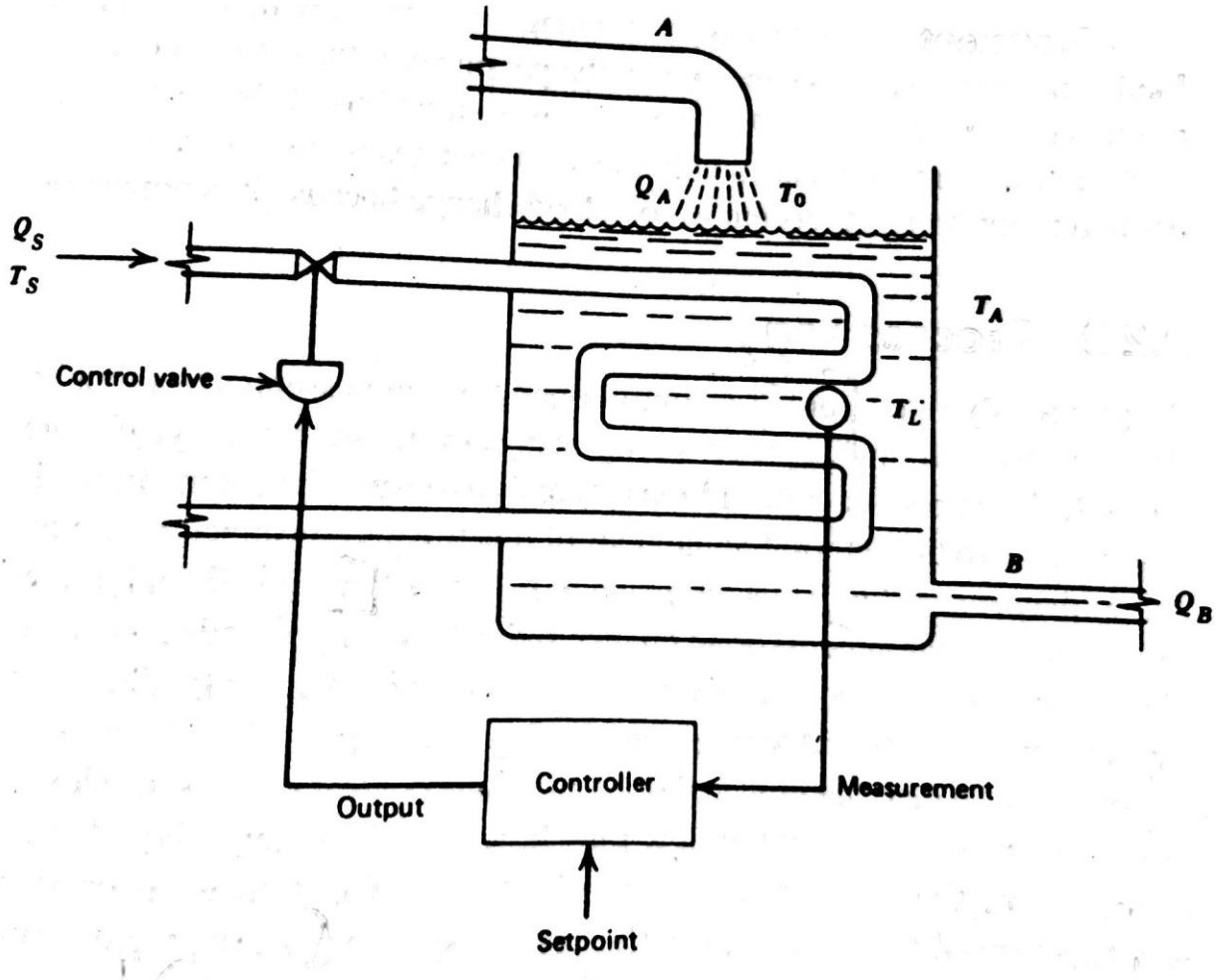
SECTION-A

1. Can automation systems, like a DCS, communicate using industry standard Communication drivers like Modbus? [1]
2. Can we provide help about specific alarms that the operators can access easily? [2]
3. Can the SCADA system do multiple applications and use the same Historian? [2]
4. Solid state input devices with NPN transistors are called [1]
   a) Sinking input device
   b) Sourcing input device
   c) Sourcing-Sinking input device
   d) Analog device
5. Define the significance of the following in reference to PLC: [10]
   i. Watchdog Timer
   ii. Program Scan
   iii. Chassis
   iv. Downloading
   v. Forcing of I/O's
6. In a PID controller, the overshoots has increased. The derivative time constant has to be __ so as to reduce the overshoots: [1]
   a) Increased
   b) Reduced
   c) Reduced to zero
   d) None of the above
7. Which of the following system provides excellent transient and steady state response: [1]
   a) Proportional action
   b) Proportional + Integral action
   c) Proportional + Differential action
   d) Proportional + Integral + Differential action

8. The integral control: [1]
   a) Increases the steady state error
   b) Decreases the steady state error
   c) Increases the noise and stability
   d) Decreases the damping coefficient
9. Proportional band of the controller is expressed as: [1]
   a) Gain
   b) Ratio
   c) Percentage
   d) Range of control variables

SECTION-B

10. List the characteristic of PD control action.
11. Differentiate between fixed type and modular type PLC's.
12. Explain Two position or ON-OFF control.
13. Define the variables in the system of below figure that constitute the process load.



SECTION-C

14. In process plants, reduced voltage start-up techniques are used for moving conveyors, In reference to same develop a PLC program to achieve star delta configuration.
    Also, design its power circuit and control circuit diagram.
15. An integral controller is used for speed control with a setpoint of 12 rpm within a range of 10 to 15 rpm. The controller output is 22% initially. The constant K_I = -0.15% controller output per second per percentage error. If the speed jumps to 13.5 rpm, calculate the controller output after 2s for a constant $e_{p.}$