

Roll No: -----

**UNIVERSITY OF PETROLEUM  
AND ENERGY STUDIES**



**End Semester Examination – December, 2017**

**Program/course: M.Tech PLE**

**Subject: Telemetry and SCADA Systems**

**Code: MPTI701**

**No. of page/s: 2**

**Semester – III**

**Max. Marks : 100**

**Duration : 3 Hrs**

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- Note: 1) Mention Roll No at the appropriate place in the question paper.  
2) Answers should be brief and concise.  
3) All questions are compulsory.

**Section A (4Q×5M=20 Marks)**

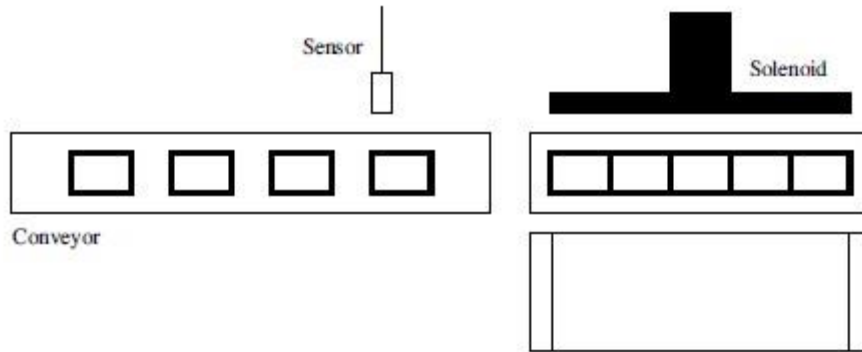
1. List the features and benefits of PLC.
2. List the significant difference between a microprocessor and a PLC?
3. Discuss the need of Data Acquisition systems?
4. Implement the following digital operations using PLC ladder logic equivalent.
  - i. AND Gate
  - ii. OR Gate

**Section B (5Q×8M=40 marks)**

5. Define telemetry and its significance in SCADA system? Name various modes of data transmission available for telemetry system.
6. What is the importance of SCADA in Pipeline monitoring? For a small scale pipeline network of not more than 50 Km. long is implementing SCADA fruitful, give reason?
7. As per your own discretion, consider any local industry process where a PLC and SCADA might be installed. List and describe what environmental factors must be considered before installing the PLC and SCADA system for control of this process.
8. Define SCADA systems using the block diagram of its system architecture. Also, explain the functioning of its sub-systems.
9. Discuss briefly various possible reasons of the failure of SCADA system in any application.

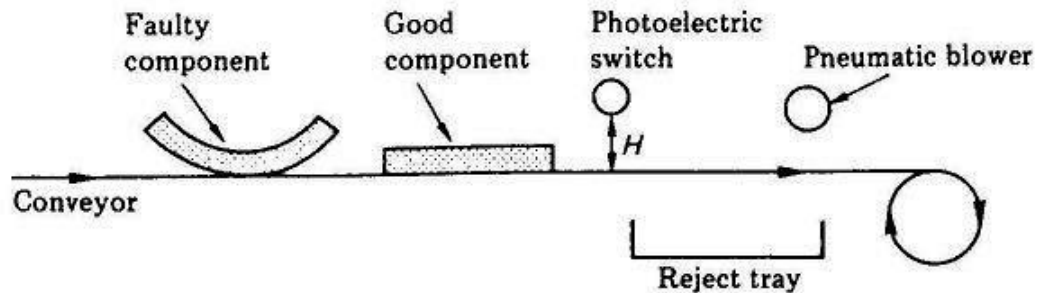
**Section C (2Q×20M=40 marks)**

10. Develop a PLC ladder program to control circuit for packaging machine. The control circuit is used to detect and count the number of products being carried on an assembly line. When it counts five products, the circuit energizes a solenoid. The solenoid is energized for a period of two seconds and is then shunts off, causing it to retract.



11. We are using a fault rejecting machine to detect and reject faulty components. Components are transported on a conveyor past a retro-reflective type photoelectric switch. The photoelectric switch is positioned at a height (H) above the conveyor where (H) represents a tolerance value for component height. Good components pass underneath the photoelectric switch and no signal is generated. Faulty components break the light beam twice as they pass the photoelectric switch.

Develop a ladder logic program to do so.



**Reject system**

\*\*\* End of Ques. Paper \*\*\*

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**Section A (4Q×5M=20 Marks)**

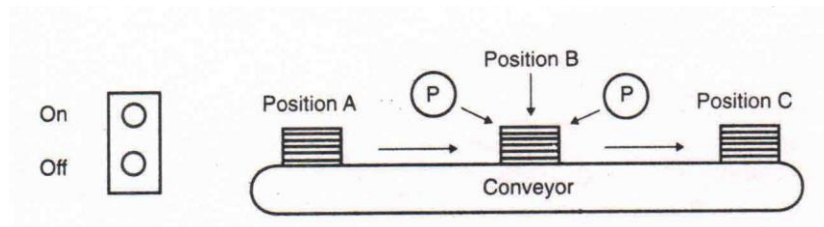
1. Name any four protocols for serial and parallel data transmission. Also, compare the advantages of serial vs. parallel data transmission.
2. Compare wired vs. wireless networks on the basis of installation time, cost, mobility, reliability, speed, bandwidth, security, etc.
3. Discuss the significance of telemetry in SCADA system?
4. Discuss data acquisition system and its significance in SCADA?

**Section B (5Q×8M=40 marks)**

5. Discuss the architecture of SCADA system briefly along with its diagram.
6. Identify all possible threats of a SCADA Systems.
7. Discuss the major risk elements that exist in SCADA systems.
8. Discuss the steps involved in the key-assessment of the SCADA Systems.
9. What is the importance of SCADA in Pipeline monitoring? For a small scale pipeline network of not more than 50 Km. long is implementing SCADA fruitful, give reason?

**Section C (2Q×20M=40 marks)**

10. Develop a PLC ladder program to control circuit for stacking machine. The control circuit works as: when the ON button is pushed, a stacker (S) starts stacking plywood sheets at position A. Stack height is controlled by a PLC counter function, not a height sensor. When 12 parts are stacked, the conveyor goes ON and moves the stack to position B. A sensor is used to stop the conveyor at B. At B, paint (P) is applied for 12.5 seconds. After painting is complete, the conveyor is restarted manually. The conveyor then moves parts to position C. At position C the stack stop automatically and the stack is removed manually. The stop button stops the process any time it is depressed. Assume that only one stack is on the conveyor at a time. Add limit switches and other devices as required.



11. A motor will be controlled by two switches. The *Go* switch will start the motor and the *Stop* switch will stop it. When the motor is active a *light* should be turned on. The *Stop* switch will be wired as normally closed. The motor should run for at least 10 sec. if the *stop* switch is pressed for one second, but if *stop* switch is pressed for 3 sec. the motor should stop immediately. To indicate the duration of the *stop* switch LED is used. If the *stop* switch is pressed for 3 sec. to start the motor again the *Go* switch must be pressed for 10 sec. Draw a ladder logic program to simulate the operation.

\*\*\* End of Ques. Paper \*\*\*