Name: **Enrolment No:**	UPES UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2019

Course: Telemetry & SCADA system **Semester: III**
Program: M.Tech. PLE **Time 03 hrs.**
Course Code: CHPL8003 **Max. Marks: 100**

Instructions: 1) Mention Roll No at the appropriate place in the question paper.
2) Answers should be brief and concise.

SECTION A 20 marks – All questions are complusory

S. No.		Marks	CO
Q1	What is the importance of SCADA in Pipeline monitoring?	**5**	**CO1**
Q2	Elucidate the significance of PLC in SCADA.	**5**	**CO1**
Q3	Differentiate between internal and external leak detection methods.	**5**	**CO2**
Q4	Explain the significance of telemetry in SCADA system	**5**	**CO2**
SECTION B 40 marks. All questions are compulsory			
Q5	Highlight the differences between IoT, Cloud, SCADA and DCS	**10**	**CO3**
Q6	An inherent feature of SCADA is efficient leak detection. Differentiate between internal and external leak detection methods. Explain any external method of leak detection with working principle, advantages and limitations.	**10**	**CO3**
Q7	An indicating light is to go ON when a count reaches 25. The light is then go off when a count of 30 is reached. Design a PLC ladder logic program for this process	**10**	**CO4**
Q8	A conveyer is run by switching on or off a motor. We are positioning parts on a conveyer with an optical detector. When the optical sensor goes on, we want to wait 1.5 seconds, and then stop the conveyer. After a delay of 2 seconds the conveyer will start again. Write a ladder logic program to implement the following system	**10**	**CO4**
SECTION-C 40 marks. Attempt any two questions			
Q9	In a gasoline distribution center, each storage tank is connected to distribution lines via 3 pumps. (2-normal operation, 1-stnadby) In auto mode the selector logic configuration is: • 1 Running mode: the first pump available in the sequence will start. • Running mode: the second available pump will start on receiving 'ADD 1 ON' command from the control room. • 3 Running mode: The third pump will start on receiving 'ADD 2 ON' from the control room.	**20**	**CO4**

	• Based on the selector logic, the pumps can be stopped sequentially on receiving 'ADD 2 OFF' and 'ADD 1 OFF' command from the control room. • The auto selector ensures that if any other pump is selected, the former pump selection shall be reset and the later shall be selected. Pump selection shall reset in any of the following conditions: • Any other pump selected. • Corresponding pump tripped (due to circuit breaker fault or process trip condition) Design a SCADA control philosophy for the above-mentioned conditions. Also identify various analog and digital I/O's for the same.		
Q10	Write a program to run a CNC machine as follows: When the specimen is kept on the platform of CNC, a sensor gives an output to LED indicating that it is placed correctly. After an interval of 10 msec. a plunger closes to hold the specimen in position. Along with the plunger operation the tools mounted on the vertical shaft moves downwards till the tool touches the specimen, this is indicated by a sensor mounted on tool assembly, followed by drilling operation in which the motor for toll rotation drills the hole in specimen for about 20 sec. thereafter the shaft again moves upwards to its home position via same motor the home position of shaft is indicated by a limit switch. The plunger than releases the specimen which is, pushed on to a conveyer with the help of pneumatic actuator. At any point of time the system can shut with the help of a manual hard switch which when pressed for 5 sec. shuts down the entire machine.	**20**	**CO4**
Q11	Describe a recent SCADA attack. Identify the key vulnerable points for the exploited by the attacker. Suggest security measures to prevent the attack.	**20**	**CO4**