



**FEDERAL UNIVERSITY OF TECHNOLOGY MINNA**  
**SCHOOL OF ELECTRICAL ENGINEERING AND TECHNOLOGY**  
**DEPARTMENT OF MECHATRONICS ENGINEERING**  
**FIRST SEMESTER 2019/2020 ACADEMIC SESSION**

**MCE 511: INDUSTRIAL AUTOMATION**

**TIME ALLOWED: 2 HOURS**

**CREDIT UNIT: 2**

**LEVEL: 500**

**Instruction: Attempt Any 4 (four) Questions.**

**Question 1 (25marks)**

- (a.) Enumerate and explain the four basic constituents of the SCADA System.
- (b.) Explain the first Four generations of the SCADA System recently in use with suitable sketches for each of the generation.
- (c.) List 6(six) methods used in SCADA deployment.

**Question 2 (25marks)**

- (a.) Describe a typical thermocouple and show how its functions in stream power Plant.
- (b.) List the constituents of the following thermocouple: (i.) Type J (ii.) Type K (iii.) Type Y (iv.) Type R (v.) Type T.
- (c.) Enumerate two differences between thermocouple and Pyrometry as an industrial temperature measuring system.

**Question 3(25marks)**

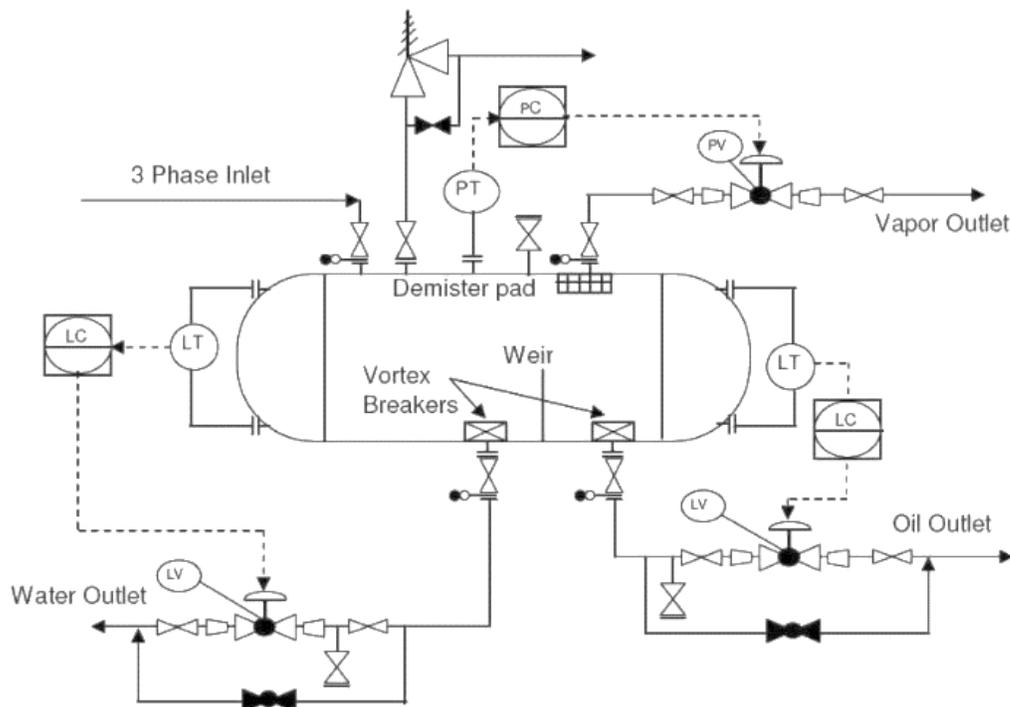
- (a.) Explain the term "Distributed Control System (DCS)",
- (b.) With suitable illustration describe a simple DCS can be configured
- (c.) List and explain the three main qualities of the Distributed Control System

### Question 4(25marks)

- (a.) Enumerate 5(five) difference between DCS and SCADA System.
- (b.) With suitable illustration explain the process plant can be made to interact between the DCS and SCADA.
- (c.) As an aspiring consultant in the field of automation, a client has approached you for a suitable SCADA or DCS solution. After listening to the client's brief and analysis, you are now expected to recommend any known 5 (five) DCS Vendors and 2(two) SCADA Vendors to a client as an Automation Engineering personnel.

### Question 5(25marks)

- (a.) What are the significance of Piping and Instrumentation Diagram (P&ID) in industrial Automation?
- (b.) What are the significance of Alarm and Trip in safety instrumented system (SIS)?
- (c.) Danata & Son Nig LTD receives three tucks of condensate for its refinery, and the condensate has to be separated first before refining process. Read and interpret the process of separating the condensate using the P&ID configuration in Figure 1 (Hints: the condensate separation process in figure gives out water, oil and vapour)



## Figure 1