

GANPAT UNIVERSITY**B. Tech. Semester: VII (Electrical) Engineering****Regular Examination November – December 2014****2EE 703: INDUSTRIAL INSTRUMENTATION & AUTOMATION****Time: 3 Hours****Total Marks: 70****Instruction:** 1. Attempt all questions.

2. Make suitable assumptions wherever necessary.

3. Figures to the right indicate full marks.

Section - I

- Que-1** [A] Draw a block diagram showing in very general terms the main unit in a PLC. [6]
Explain each component in detail.
- [B] Draw the ladder rungs to represent: [6]
- Two switches are normally open and both have to be closed for motor to operate.
 - Either of two, normally open, switches has to be closed for a coil to be energized and operate an actuator.
 - A motor is switched on by pressing a spring-return push button start switch, and the motor remains on until another spring-return push button stop switch is pressed.
 - A lamp is to be switched on if there is an input from sensor A or sensor B.
 - A light is to come on if there is no input to a sensor.
 - A solenoid valve is to be activated if sensor A gives an input.

OR

- Que-1** [A] Explain the closed loop control system by using PLC with suitable example. [6]
- [B] Devise ladder programs for systems that will carry out the following tasks: [6]
- Give an output after a photocell sensor has given 10 pulse input signals as a result of detecting 10 objects passing in front of it.
 - Give an output when the number of people in a store reaches 100, there continually being people entering and leaving the store.
- Que-2** [A] What is the function of protocol driver program? [4]
- [B] What equipment is needed to send an analog signal from an RTU to an MTU? [4]
- [C] Why is simplex communication not used for SCADA? [3]

OR

- Que-2** [A] Draw and describe the following for Thermistor: [6]
- Resistance-temperature characteristics
 - Voltage-current characteristics
 - Current-time characteristics
- [B] What is MTU? What does the MTU do? [5]

- Que-3** **Attempt any three**
- [A] Explain smart sensors. [4]
 [B] Draw the general architecture of smart sensor. [4]
 [C] An RTU recognizes that a motor that should be running has stopped. It is 2:00 a.m. [4]
 For this motor failure, overtime is not allowed, so no maintenance crew will be sent to investigate until 9:00 a.m.
- a. Would a ten-minute scan rate be acceptable?
 b. Would s one-hour scan rate be acceptable?
 c. Would a twenty-four hour scan rate be acceptable?
- [D] State and explain the characteristics of the relay, transistor and triac types of PLC [4]
 output channels.

Section – II

- Que-4** [A] Explain the working principle of Photo-transistor and Photo-diode cell. [6]
 [B] Explain any one low pressure measurement technique. [6]
- OR**
- Que-4** [A] Explain vibration measurement techniques. [6]
 [B] Explain the black body condition used in pyrometer. [6]
- Que-5** [A] Explain linear velocity measurement techniques. [6]
 [B] Derive the equation for the strain gauge relating gauge factor and poisson's ratio. [5]
- OR**
- Que-5** [A] Derive the equation for piezo-electric crystal relating output voltage with applied pressure and thickness. [5]
 [B] Explain real time system with suitable example. [6]
- Que-6** **Attempt any three**
- [A] Explain flow meter using thermister; also list the advantages and limitations. [4]
 [B] Write a short note on liquid level measurement. [4]
 [C] How density can be measured using transducers? [4]
 [D] Explain digital encoding. [4]

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