Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- VIIth SEMESTER–EXAMINATION – MAY/JUNE- 2012

Subject code: 171702 **Date: 08/06/2012**

Subject Name: Programmable Automation Controller

Time: 02:30 pm – 05:00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Draw memory map of PLC for 16KB RAM. Show range of the addresses in hexadecimal.	**07**
	(b)	Draw and Explain block diagram of PID module of PLC. Explain typical PID functions of PLC.	**07**
Q.2	**(a)**	Enumerate various analog I/O devices which can be interfaced with PLC. Explain any one input device and one output device in brief.	**07**
	(b)	Explain discrete A.C. I/O modules of PLC with the help of internal block diagram.	**07**
		OR	
	(b)	Discuss ladder construction limitations with necessary schematic ladder diagrams.	**07**
Q.3	**(a)**	Describe how PLC scans the inputs, execute the program and update the outputs with necessary schematic diagrams.	**07**
	(b)	Explain PLC bit handling functions, in brief.	**07**
		OR	
Q.3	**(a)**	Convert following word descriptions to both gate symbols and PLC ladder logic diagrams:- (1) For output H to be on, A must be on and both input C and D must be off. In addition one or more of inputs E, F and G must be on. (2) Four pushbutton stations control a fan. Each stations has a start and stop button. Two door interlocks must be closed before the fan may run. Pushing any button will make the fan run, and the fan is sealed on when the start button is released. Pushing any stop button turns the fan off and also prevents the fan from starting or running	**07**
	(b)	Explain Computer Integrated Manufacturing using PLC.	**07**
Q.4	**(a)**	Explain on delay and off delay timers with waveforms and suitable industrial examples.	**07**
	(b)	Which are the two basic comparison functions offered by many PLCs? How other comparison functions are derived from the same? Explain PLC advanced comparison functions.	**07**
		OR	
Q.4	**(a)**	Enumerate various data handling functions offered by PLC and explain any two functions.	**07**
	(b)	Explain PLC analog signal processing with suitable example.	**07**
Q.5	**(a)**	Explain monitor mode functions and force mode functions of PLC.	**07**

(b) Construct ladder diagrams for the following processes:- **07**

(1) There is a one push button and one motor. When the push button is pressed once, the motor is on and when it is pressed again, motor is turned off. Then the same process should be repeated.

(2) A process has following four inputs which are connected to four PLC counters :

A IN021 Up counter
B IN022 Down counter(preset at 20)
C IN023 Up counter
D IN024 Down counter(preset at 25)

When A reaches 7 or B reaches 0, output L is to go on.
When C reaches 6 and D reaches 0, output M is to go on.
When both L and M are on, output N is to go on.
Process master ON is IN011, Process master reset is IN012.

OR

Q.5 Draw schematic diagram, list the process hardware, Prepare event sequence, construct LLD and show I/O connection details for the following processes:

(a) When a part is placed on the conveyor, it automatically moves down the conveyor. In the middle of the conveyor, the part goes through 2-foot-long painting section. When part reaches at the center of the painting section, conveyor stops and the paint sprayer operates for 30 seconds on the part. Then conveyor starts again. After painting booth, at a distance of 5 foot, a stamping machine is installed, at which place the conveyor stops for 5 seconds and part is stamped. When the part reaches the end of the conveyor, the conveyor stops and the part is removed. When one part leaves the painting section, then only another part can be placed on the conveyor. Assume suitable input/output devices and data to fulfill above requirement. **07**

(b) A bottling process for 12 bottles operates as follows: **07**

Bottles are counted until 12 are in position for filling.
When in position in the carton, the 12 bottles are filled simultaneously for 8.5 seconds.
After filling, there is a pause of 4.5 seconds for foam to subside.
The 12 caps are then put on and counted as they are installed.
A solenoid then pushes the completed carton of 12 on to a conveyor. The system is reset for a new group (to be restarted manually) of 12 bottles by a limit switch that indicates that the carton is out of the "fill" position and on the conveyor. Assume suitable input/output devices and data to fulfill above requirement

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