Seat No.: _____   Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–VII • EXAMINATION – WINTER 2013

Subject Code: 171702   **Date: 05/12/2013**
Subject Name: Programmable Automation Controller
Time: 10:30 TO 01:00   **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 the layout of PLC input module for D.C. Input and explain the function of each   **07**
block.
(b) Explain the operational cycle of PLC.   **07**

Q.2 (a) Develop the PLC ladder logic equivalent for full adder .   **07**
(b) Draw the ladder programs for the following.   **07**
F(a,b,c,d) = $\sum$(0,1,2,4,5,6,8,9,12,13,14)
OR
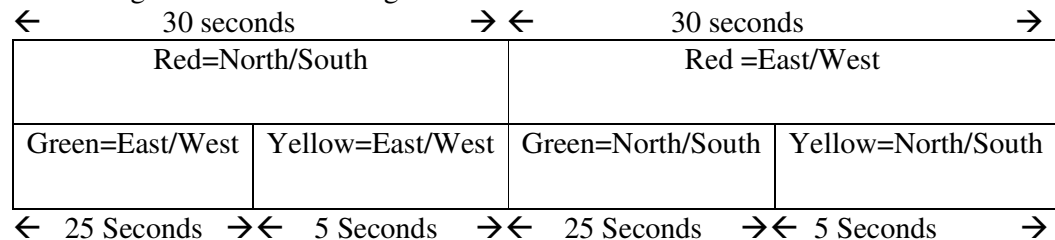**(b)** Draw the ladder programs for the following.   **07**
F(w,x,y,z,) = $\prod$(0,1,2,5,8,9,10)

Q.3 (a) Develop a PLC program(ladder diagram) to convert the   temperature in Fahrenheit   **07**
to the temperature in Celsius.
(b) Explain basic comparison functions in PLC.   **07**
OR
Q.3 Develop the PLC ladder diagram for the control of traffic lights in four directions ,   **14**
The timing chart is shown in figure.

← 30 seconds →		← 30 seconds →	
Red=North/South		Red =East/West	
Green=East/West	Yellow=East/West	Green=North/South	Yellow=North/South

← 25 Seconds →← 5 Seconds →← 25 Seconds →← 5 Seconds →

Q.4 (a) Explain the following functions in PLC using suiting examples.   **07**
   (i)   SHIFT RIGHT function in one Register
   (ii)   SHIFT RIGHT   function in Multiple Registers
   (iii)   REGISTER ROTATE function
(b) Explain REGISTER TO TABLE MOVE and TABLE TO REGISTER   MOVE   **07**
Functions in PLC.
OR
Q.4 (a) Two linear analog input signals of 0 to 4 volts are to be multiplied and the result put   **07**
out on a linear output of 0 to 150 volts. Trace the numbers if the inputs are 2.85 and
3.45 volts. Draw necessary sketch to carry out this operation using PLC and explain it.
(PLC input and output modules are   8-bit base).
(b) Discuss the factors to be considered in selecting a PLC.   **07**

Q.5 (a) Explain the followings in PLC.   **07**
   (i) Grounding Scheme
   (ii) Suppression Techniques
(b) Write short note on "Preventive maintenance of PLC".   **07**

Q.5 **(a)** Develop a ladder program to generate a square wave(Output W) of 0.5 Hz and 50%   **07**
duty cycle.

(b) A process has four inputs which are connected to four PLC counters ;   **07**
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 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 IN 012 .\

Develop PLC ladder program for this application.

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