

December 2018

ADVANCED PROCESS CONTROL*Time Allowed: 3 Hours**Full Marks: 70***Answer to Question No.1 is compulsory and to be answered first.****This answer is to be made in separate loose script(s) provided for the purpose.****Maximum time allowed is 45 minutes, after which the loose answer scripts will be collected and fresh answer scripts for answering the remaining part of the question will be provided.****On early submission of answer scripts of Question No.1,
a student will get the remaining script earlier.****Answer any five questions from Group-A & B, taking at least two from each group.**

1. Answer the following questions (any ten): 10x2

Fill in blanks:

- i) In a ratio control of two flow streams, one stream is called _____ variable and the other stream is called _____ variable.
- ii) The response time of _____ loop is more than _____ loop in cascade control system.
- iii) In a thermal power plant, for three element type boiler drum level control, drum level, _____ & _____ is considered as process parameter.
- iv) The feed forward control is an _____ control and _____ model is used in feed forward control.
- v) Combustion control is used for optimization of the use of _____ and _____.

Answer in brief

- vi) What are SAMA diagram?
- vii) Show logical AND operation using FBD in PLC.
- viii) What is the function of 'control rod' in Nuclear Power Plant?
- ix) What is the function of operating station of a DCS?
- x) What is 'Swell' and 'Shrinkage' in boiler drum?
- xi) Name different languages used in PLC programming.
- xii) Write advantage of feed forward control over feedback control.

Group-A

2.
 - a) What is Process Flow Diagram?
 - b) Explain P&ID with suitable example. 3+7
3.
 - a) What is three element type boiler drum level control system of a thermal power plant? Explain that system with suitable PI diagram.
 - b) When single element drum level control system is sufficient to control the level of boiler in thermal power plant? 8+2
4.
 - a) What is feed forward control?
 - b) Explain a typical feed forward control system to control the temperature of heat exchanger system with suitable diagram. 2+8

5. a) Draw a neat PI diagram and explain combustion control in thermal power plant.
b) What are the major process variables that are measured in a blast furnace? 8+2

Group-B

6. a) What is SCADA?
b) Explain a simple SCADA system with Block diagram. 2+8
7. a) Write few differences between PLC and DCS.
b) Explain DCS with very basic block diagram. 3+7
8. a) Explain operation of PLC with block diagram.
b) Write a program in ladder to get an output Q0.0 when any two among three switches I4.0, I4.1 and I4.2 are in opposite state. 6+4
9. a) Explain DDC (Direct Digital Control) with simplified block Diagram?
b) Write advantages and disadvantages of DDC . 2+8
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