

[86] SARDAR PATEL UNIVERSITY

Vallabh Vidyanagar - 388120

B. Sc. (5th Semester) Examination – December 2020**US05CAPH24 (Concepts of Applied Physics and Control Systems)**Day and Date: ~~Tue~~ ^{Wed} day, 29/12/2020

Time: 02:00 pm to 04:00 pm

Maximum Marks: 70**Que 1 Multiple Choice Type Questions.****[10]**

- 1 NDT technique is used to determine _____.
 - a) Location of defects
 - b) Chemical composition
 - c) Corrosion of metal
 - d) All of these
- 2 In process control industry, the controlled variable can be controlled with the help of _____.
 - a) Process value
 - b) Controlling variable
 - c) Cycling
 - d) Error
- 3 Selection of PLC depends on _____.
 - a) I/O quantity and types
 - b) Memory size and types
 - c) Both a) and b)
 - d) None of these
- 4 A ladder diagram is used as a _____.
 - a) Input module
 - b) Communication facility
 - c) Storage facility
 - d) PLC programming
- 5 The difference between set value and process value is known as _____.
 - a) Error
 - b) Process lag
 - c) Controller
 - d) Self-regulation
- 6 The _____ control mode can not be used alone in process control industry.
 - a) Integral
 - b) Derivative
 - c) ON-OFF
 - d) PID
- 7 "All spontaneous processes produce an increase in the entropy of the universe" statement is known as _____.
 - a) First law of thermodynamics
 - b) Second law of thermodynamics
 - c) Third law of thermodynamics
 - d) None of these
- 8 When the atoms are in equilibrium, potential energy is _____.
 - a) Negative
 - b) Positive
 - c) Constant
 - d) Both a) and b)
- 9 For the ultrasonic inspection the required frequency " f " of sound wave is _____.
 - a) > 25 MHz
 - b) < 20 Hz
 - c) > 20 Hz
 - d) $20 \text{ Hz} < f < 20 \text{ KHz}$
- 10 Which among the following is not a type of non-destructive testing?
 - a) Compression testing
 - b) Visual testing
 - c) Ultrasonic testing
 - d) Eddy current testing

[15]**(P.T.O.)**

Que 2 Fill in the blanks and True – False.

[08]

- 1 If the atoms are at equilibrium, then the interaction force in between them is zero (TRUE/FALSE).
- 2 Liquid penetrant inspection technique is used to identify the subsurface flaws/ defect (TRUE/FALSE).
- 3 PLC can be used for industrial automation (TRUE/FALSE).
- 4 SCADA stands for Supervisory Control and Data Acquisition System (TRUE/FALSE).
- 5 In the DNA structure, Adenine pairs with _____.
- 6 Acoustic emission technique is used to locating _____.
- 7 In process control industry, the variable under control is known as _____.
- 8 The time within which no control action takes place is known as _____.

Que 3 Short Answer Questions (Attempt any 10 out of 12).

[20]

- 1 Define: Process lag and Variable range.
- 2 Temperature has a range of 300 to 440 K. Set point of 384 K. Find percentage span error when temperature is 379 K.
- 3 Explain linear and non-linear control systems.
- 4 Give advantages of using programmable logic controllers (PLCs).
- 5 Briefly explain PLC installation.
- 6 Write on PLC selection.
- 7 Sketch the helical structure of RNA.
- 8 What is ionization energy?
- 9 Brief the thermodynamics zeroth law.
- 10 What are the advantages of Non-Destructive Technique over the other techniques?
- 11 Which parameters can be determined with the help of NDT?
- 12 Enlist any four techniques to use as NDT.

Que 4 Long Answer Questions (Attempt any 04 out of 08).

[32]

- 1 Discuss cascade control system with necessary diagram.
- 2 Write a detailed note on feedforward control system with necessary diagram.
- 3 Explain programmable logic controller (PLC) with necessary diagram.
- 4 Give an account of PLC programming.
- 5 What are the laws of thermodynamics? Explain in detail.
- 6 Explain the double helical structure of RNA with the appropriate figure.
- 7 Explain in detail the magnetic particle inspection technique.
- 8 Detail the ultrasonic inspection method with appropriate figure.

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[23]