KATHMANDU UNIVERSITY
End Semester Examination
February/March, 2018

Marks Scored:

Level : B.E.
Year : IV

Course : MEPP 427
Semester: I

Exam Roll No.:

Time: 30 mins.

F.M. : 20

Registration No.:

Date MAR 0 8 2018

SECTION "A"
[10 Q.×1=10 marks]

Encircle the most appropriate option.

1. In which stage the measurement system comes in contact with the measured or the quantity to be measured?
   a) Transducer Stage
   b) Signal Processor Stage
   c) Output Stage
   d) Input stage

2. The mechatronics is an interdisciplinary field in which the disciplines those act together are
   a) Mechanical systems and Electronic systems
   b) Mechanical systems and Information technology
   c) Electronic systems and Information technology
   d) Mechanical systems, Electronic systems and Information technology

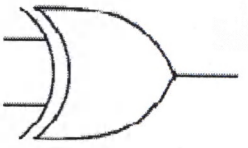
3. Mechanical energy is converted into fluid power when air is
   a) Compressed b) Exhausted c) Absent d) Extended

4. Which of the following statement is correct?
   a) Sensors and actuators are both example of transducer
   b) Sensors and transducer are both example of actuator
   c) Actuators and transducer are both example of sensor
   d) Senor is an example of both actuator and transducer

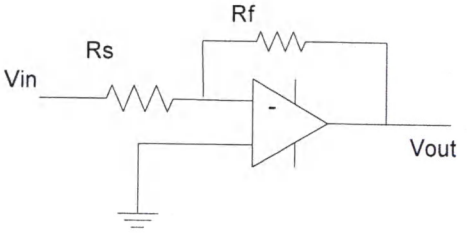
5. Sensor that does not require external power source to create an output is
   a) Active sensor b) Passive sensor c) Variable sensor d) Thermo sensor

6. Digital to Analog conversion is ..... Analog to Digital conversion
   a) Less complex than
   b) More complex than
   c) As complex as
   d) Unpredictable

7. The figure alongside shows
   a) OR gate b) AND gate c) NOR gate
   d) XOR gate



8. The figure alongside shows
   a) Inverting amplifier
   b) Non-inverting amplifier
   c) Summing amplifier
   d) Voltage follower



9. An electronic device which use small control signal and switch large load current.
a) Stepper motor b) Solenoids c) Solid –state switches d) Relays

10. Operation carried out by a NOT gate are also termed as
a) Inverting b) Converting c) Reverting d) Reversing

SECTION "B"
[5 Q. × 1=5 marks]

Write 'T' for TRUE and 'F' for FALSE statement.

11. Solenoids can be used to provide electrically operated actuators. [ ]

12. Gear motors employ two or more gear sets for the control of direction of the fluid in rotational hydraulic actuator. [ ]

13. Encoder is the combinational logic circuit that converts an n-bit binary code into 2n output code. [ ]

14. Full adder has only two inputs and two outputs. [ ]

15. A potentiometer can be used to convert rotary or linear displacement to a voltage. [ ]

SECTION "C"
[5Q.×1=5 marks]

Fill in the blanks with most suitable answer.

16. A …….. is a type of transducer, or mechanism that responds to a type of energy by producing another type of energy signal, usually electrical.

17. Passive sensors directly generate an electric signal in response to a ……..

18. Binary variable can take only ……. and …….

19. …… actuators extract energy from a fluid and convert it to mechanical energy to perform useful work

20. As the cam rotates so the follower is made to rise, dwell and ……..

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SECTION "D"

Attempt *Any FIVE* questions

1. a. Define Mechatronics and describe its role in context of Nepalese industries. [2+3]
   b. Differentiate between Sensor and Transducer. [3]
   c. Briefly describe Active and Passive sensor. [3]

2. a. Explain full adder with symbolic representation, logic diagram and truth table [5]
   b. Develop the K-map from following truth table. [3]

A	B	P
0	0	1
0	1	1
1	0	0
1	1	1

   c. Develop the state diagram from the following state table. [3]

Present State	Next State		Output	
Q1Q2	X=0	X=1	X=0	X=1
00	11	01	0	0
01	11	00	0	0
10	10	11	0	1
11	10	10	0	1

3. a. Define operational Amplifier and explain the following Op amp circuits with diagrams [5]
      I. Voltage follower
      II. Inverting amplifier
      III. Non-inverting Amplifier
      IV. Summing Amplifier
   b. Describe photosensor and proximity sensor with respective applications. [2+2]
   c. Explain signal conversion with an example. [2]

4. a. Define Rotary pneumatic actuator and explain linear hydraulic actuator. [2+3]
   b. What are the different types of AC motors that can be used as actuators? [3]
   c. How can hydraulic actuator be applied to log splitter? [3]

5. a. Define robotics and explain the foundation of robotics. [4]
   b. What is Microprocessor? Explain Micrcomputer system. [2+2]
   c. Write the methodology and state the application of your mini project in context of Nepal. [3]

6. a. Discuss the working of four bar mechanism with suitable diagram [4]
   b. What is Ultrasonic Sensor? Discuss its applications. [3]
   c. Define any *TWO* [2×2]
      I. Hall effect
      II. Solenoids
      III. DC motors
      IV. Solid state switch