Enrollment No.....................................

Faculty of Engineering
End Sem (Odd) Examination Dec-2022
ME3CO21 Sensors and Control

Programme: B.Tech.   Branch/Specialisation: ME

Duration: 3 Hrs.   **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

Q.1   i.   Which of the following is not a feature of a good control system?   **1**
     (a) Slow response
     (b) Sufficient power handling capacity
     (c) Good stability
     (d) Good accuracy

  ii.   Zeroes are defined as?   **1**
     (a) Roots of the denominator of the closed loop transfer function
     (b) Roots of the numerator of the closed loop transfer function
     (c) Roots of numerator and denominator of closed loop transfer function
     (d) None of these

  iii.   Which of the following is not a characteristic of an ideal transducer?   **1**
     (a) High dynamic range   (b) Low linearity
     (c) High repeatability   (d) Low noise

  iv.   What is the principle of operation of LVDT?   **1**
     (a) Mutual inductance   (b) Self-inductance
     (c) Permanence   (d) Reluctance

  v.   What is the use of the IR Sensor?   **1**
     (a) Object detection   (b) Humidity detection
     (c) Image processing   (d) GPS

  vi.   LDR sensor is abbreviated as _____.   **1**
     (a) Light Dependent Resistor
     (b) Light determinant Resistor
     (c) Luminous Duplicated Resistor
     (d) None of these

vii. Which of the following electrical characteristics is not exhibited by an ideal op-amp? **1**
(a) Infinite voltage gain   (b) Infinite bandwidth
(c) Infinite output resistance   (d) Infinite slew rate

viii. A _____ is an electronic circuit, which compares the two inputs that are applied to it and produces an output. **1**
(a) Waveform generators   (b) Active filters
(c) Comparator   (d) Op Amp

ix. The acronym PLC stands for- **1**
(a) Pressure Load Control   (b) Programmable Logic Controller
(c) Pneumatic Logic Capstan   (d) PID Loop Controller

x. A PLC is capable of- **1**
(a) Sequencing and data manipulation
(b) Timing and counting
(c) Arithmetic and logical
(d) All of these

Q.2   i. What are measuring devices? What should be the ideal characteristics of a measuring device? **4**

    ii. Explain sensor and transducer with classification. **6**

OR   iii. Define transfer function of a control system. Distinguish between open loop and closed loop system. **6**

Q.3   i. Explain working of LVDT with applications. **4**

    ii. What are light and infrared sensors? Explain its working with applications. **6**

OR   iii. What are velocity sensors? Explain types of velocity sensor with applications. **6**

Q.4   i. Define with example gas sensor. **3**

    ii. Explain different types of automobile sensor and its uses. **7**

OR   iii. Explain different types of home appliance sensor and its uses. **7**

Q.5   i. Define error detector and digital actuator. **4**

    ii. Explain operational amplifier with block diagram. What are the characteristics of ideal operational amplifier? **6**

OR   iii. Explain working of integrator, comparator and differentiator. **6**

Q.6   Attempt any two:

    i. Explain sensor-based control of various actuators. **5**

    ii. Discuss the working of relay control system and PLC systems. **5**

    iii. Explain closed loop control of microcomputer-based drives. **5**

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Marking Scheme
ME3CO21 Sensors and Control

Q.1 i.   (a) Slow response   1 Mark   **1**
     ii.   (b) Roots of the numerator of the closed loop transfer function   **1**
                                                                          1 Mark
     iii. (b) Low linearity   1 Mark   **1**
     iv.   (a) Mutual inductance   1 Mark   **1**
     v.   (a) Object detection   1 Mark   **1**
     vi.   (a) Light Dependent Resistor   1 Mark   **1**
     vii. (c) Infinite output resistance   1 Mark   **1**
     viii. (c) Comparator   1 Mark   **1**
     ix.   (b) Programmable Logic Controller   1 Mark   **1**
     x.   (d) All of these   1 Mark   **1**

Q.2 i.   Definition   1 Mark   **4**
           Any three characteristics of a measuring device   3 Marks
     ii.   Definition   1 Mark each   **6**
                                                                        (1 Mark*2)

           Classification.   2 Marks each
                                                                        (2 Marks*2)

OR   iii. Transfer function   2 Marks   **6**
           Difference (four)   1 Mark each
                                                                        (1 Mark*4)

Q.3 i.   Working   2 Marks   **4**
           Applications.   2 Marks
     ii.   Light sensors (definition, working, application)   3 Marks   **6**
           Infrared sensors (definition, working, application)   3 Marks
OR   iii. Definition   2 Marks   **6**
           Types   2 Marks
           Application   2 Marks

Q.4 i.   Diagram   1 Mark   **3**
           Explanation   2 Marks
     ii.   Different types of automobile sensor   1 Mark each   **7**
                                                                        (1 Mark*7)
OR   iii. Different types of home appliance sensor   1 Mark each   **7**
                                                                        (1 Mark*7)

Q.5 i.   Definition   2 Marks each **4**
                                                                        (2 Marks*2)
     ii.   Block diagram   2 Marks   **6**
           Any four characteristics   1 Mark each
                                                                        (1 Mark*4)
OR   iii. Working of integrator   2 Marks   **6**
           Working of comparator   2 Marks
           Working of differentiator.   2 Marks

Q.6   Attempt any two:
     i.   Diagram   2 Marks   **5**
           Explanation   3 Marks
     ii.   Diagram   2 Marks   **5**
           Explanation   3 Marks
     iii. Diagram   2 Marks   **5**
           Explanation   3 Marks

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