

Program: BBA in Technology Management
Semester: Summer

Date: 20 February, 2023
Time: 10:00 am – 11:30 am

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)
DEPARTMENT OF MECHANICAL AND PRODUCTION ENGINEERING

Mid Semester Examination
Course Number: MCE 4461
Course Title: Mechanical Technology II

Summer Semester: 2021 - 2022
Full Marks: 75
Time: 1 Hours 30 Minutes

There are **three** questions. Answer **all the** questions. The symbols have their usual meanings. Marks of each question and corresponding CO and PO are written in the brackets. **Assume reasonable value of missing data.**

1. a. Define accuracy and precision? If you were asked to choose an instrument having a minimum economic budget, then which one are you going to choose among the below three options? Justify your answer? CO1
PO1, PO2
(10)

Options:

- I. Low Precision, Low Accuracy
- II. High Precision, Low Accuracy
- III. High Precision, High Accuracy

- b. A load cell is calibrated in an environment at a temperature of 20°C and has the following deflection/load characteristics: (15)

Load (kg)	0	50	100	150	200	250
Deflection (mm)	0.0	0.9	1.9	3.2	4.2	4.9

When used in an environment at 35°C, its characteristic changes to the following:

Load (kg)	0	50	100	150	200	250
Deflection (mm)	0.3	1.3	2.4	3.7	4.8	5.7

- i) Determine the zero drift and sensitivity drift coefficients in units of $\mu\text{m}/^\circ\text{C}$ and $\mu\text{m}/\text{kg } ^\circ\text{C}$, respectively.
- ii) Calculate the total zero drift and sensitivity drift at 30°C in units of μm and $\mu\text{m}/\text{kg}$, respectively.

2. a. What is LVDT? Illustrate how the output voltage of LVDT changes on its different core positions. Also mention the advantages and disadvantages of LVDT. CO2
PO1, PO2,
PO10
(7)
- b. Write down the working principle of a Hall effect sensor. How do you conduct the following tasks using a Hall effect sensor: (8)
- I. Sensing a head-on movement
 - II. Sensing a side-by movement
 - III. Sensing a notch
 - IV. Sensing a metal body
- c. Define Instrumentation Calibration? State the common errors that can be minimized by this process? Explain the major steps for calibration a Bourdon Gauge? (10)
3. a. Explain the limitations of an ON-OFF controller in comparison to a PID controller? Explain the **P-action, I-action and D-action** with proper graphical Illustrations. CO4
PO1, PO10
(15)
- b. **“The right setting of P-band, I-time and D-action is very important”**- justify the above statement with proper graphical illustrations and explanation. (10)