

National Institute of Technology, Hamirpur (HP)

M.Tech in Condition Monitoring of Power Apparatus

Branch : *Electrical Engineering* Semester : *1st Semester*
 Course Name : *Sensors and Signal Conditioning* Course Code : *EE-653*

Time: 02 Hour

Maximum Marks: 50

The guidelines to be strictly adhered by the students while doing/conducting End Semester Examination.

1. The students must join the respective Google Meet Links at least 10 minutes prior to the start of Exam and must keep the camera ON till the submission of the answer sheets.
2. Each student is required to write his/her Name, Roll no, Subject name and Subject code on top of first sheet and put his/her signature with date at bottom of each sheet of the answer booklet.
3. After examination time is over, the students are given extra 15 minutes to scan and upload their duly signed answer sheets and send back on **Email id: veenanaresh@gmail.com** Any further delay in submission of paper by a student may lead to deduction in marks or the rejection of the whole answer booklet.
4. If you are found guilty of indulging in unfair means, strict action as per Institute rules shall be initiated against you.
5. The student shall retain the hardcopies of their answer sheets with them and handover the same to the undersigned while they come back in the Institute Campus.

Note: Do all parts of the questions consecutively.

- Q.1** (a) Explain torque measurement using strain gauge torque meter.
 (b) Explain the working principle and operation of angular speed measurement using photoelectric sensor.
 (c) A capacitance transducer of two parallel plates of overlapping area of $5 \times 10^{-4} \text{ m}^2$ is immersed in water. The capacitance C has been found to be 9.50 pF. Calculate the separation 'd' between the plates and the sensitivity of this transducer. Given ϵ_r for water = 81; $\epsilon_0 = 8.854 \text{ pF/m}$.
 (2.5+2.5+5)
- Q.2** Explain briefly the following:
 (a) Programmable logic controllers
 (b) R-2R ladder D/A converter with interfacing diagram to microprocessor. Also write assembly language program for it. (5+5)
- Q.3** (a) Explain microprocessor based measurement, display and control of speed of DC shunt motor. Write documented assembly language program.
 (b) SAR method of A/D conversion. (5+5)
- Q.4** Write short note on any **two** of the following:
 (i) Liquid/Gas Chromatography
 (ii) Smart sensors (5+5)
 (iii) Ultrasonic Sensors or UHF sensors
 (iv) Photo-acoustic Spectroscopy
 (v) Optical fiber sensors
 (vi) Hall Effect Sensors
- Q.5** (a) Explain working of high impedance precision full wave rectifier.
 (b) Explain working of AC- to -DC Converter. (5+5)