Graphic Era HILL UNIVERSITY

Established by an Act of the State Legislature of Uttarakhand (Uttarakhand Sanskrit 12 of 2013)
University under section 2(f) of UGC Act, 1956

Term Evaluation (Even) Semester Examination March 2025

Roll no.....

Name of the Course: B.Tech.(ME)
Semester: IV
Name of the Paper: Mechatronics
Paper Code: TME 409
Time: 1.5 hour **Maximum Marks: 50**

Note:
(i) Answer all the questions by choosing any one of the sub-questions
(ii) Each question carries 10 marks.

Q1. CO 1 (10 Marks)

a. Enlist various components of a mechatronic system? Discuss with the help of block diagram.

OR

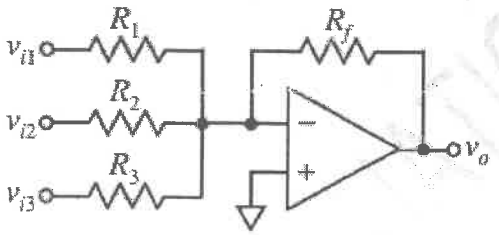
b. Draw the circuit of an op-amp inverting amplifier, and derive the expression for its voltage gain.

Q2. CO 1 (10 Marks)

a. What do you mean by CMRR, slew rate and input offset voltage of an op-amp? Write the characteristics of an ideal op-amp.

OR

b. Obtain the expression of output of following circuit:



Q3. CO 2 (10 Marks)

a. Draw the block diagram of a data acquisition system. Discuss the role and working of multiplexers in it.

OR

b. Draw the circuit of an instrumentation amplifier. Derive the expression for its output.

Q4. CO 2 (10 Marks)

a. Draw the circuit of an R-C low pass filter. Derive the expression for its frequency response, and plot it.

OR

b. (i) An RC high pass filter is formed with R= 5 kΩ, and C= 15 μF. Determine its cut-off frequency in Hertz.
(ii). Discuss how a bandpass filter can be designed?

Q5. CO 2 (10 Marks)

a. Describe the role of A/D converter in a mechatronic system? Discuss how A/D conversion is performed?

OR

b. Consider a 4 bit D/A converter with reference voltage of 5 V. Draw its circuit and determine its resolution. Also find its output voltage for input 1001.