Seventh Semester B.E./B.Tech. Degree Examination, June/July 2025
Mechatronics System Design

Time: 3 hrs.   Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Define Mechatronics, explain key elements of mechatronics system.   **(10 Marks)**
   b. Explain the design process of mechatronics system.   **(10 Marks)**

OR

2 a. Explain the application areas of mechatronics.   **(10 Marks)**
   b. Explain the types of digital encoders used for motion measurement.   **(10 Marks)**

Module-2

3 a. Explain the direct method of block diagram modeling for the transfer function:

$$T(s) = \frac{Y(s)}{R(s)} = \frac{s^2 - 3s + 4}{s^4 + 2s^3 - 5s^2 + 2s - 9}$$
                                                                                (10 Marks)
   b. Explain the analog approach of block diagram modeling.   **(10 Marks)**

OR

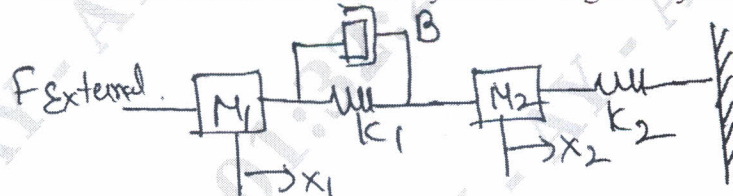4 a. Illustrate how a two-mass mechanical translation system for a given system.

Fig.Q.4(a)
                                                                                (10 Marks)
   b. Apply analogy method and develop a block diagram model of bridge circuit. **(10 Marks)**

Module-3

5 a. Explain natural and forced response with an illustration.   **(10 Marks)**
   b. Explain the commonly encountered faults with components and systems.   **(10 Marks)**

OR

6 a. Explain the first order system with natural response.   **(10 Marks)**
   b. Explain the fault detection techniques with microprocessor.   **(10 Marks)**

Module-4

7 a. Explain the elements of data acquisition system.   **(10 Marks)**
   b. Explain amplification, filtering, multiplexing.   **(10 Marks)**

OR

8 a. Explain working of inverting and non-inverting amplifier.   **(10 Marks)**
   b. Explain analog to digital conversion process. Explain sampling rate and resolution.
                                                                                     (10 Marks)

Module-5

9 a. Explain position control of a permanent magnet DC gear motor.   **(10 Marks)**
   b. Explain transducer calibration system for automotive applications.   **(10 Marks)**

OR

10 a. Explain auto control system for green house temperature.   **(10 Marks)**
   b. What is mass spring oscillation and damping? Explain with an example of mechatronics technology demonstration.   **(10 Marks)**

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