

Lib

BE (ETRS) Sem VIII (R)
Mechatronics

29105709
11-2

Con. 2657-09.

VR-4162

(REVISED COURSE)

(3 Hours)

[Total Marks : 100

- N.B.:** (1) Question No. 1 is compulsory.
(2) Attempt any four questions out of remaining six questions.
(3) Assume suitable data whenever required but justify the same.
(4) Illustrate answers with sketches wherever required.
(5) Figures to the right indicate full marks.

1. Answer any four of the following :—

- (a) What is mechatronics ? Which are the key elements of mechatronics ? Explain in brief. 5
 - (b) Give the list of gear types and draw any two diagrams of gears. 5
 - (c) Explain the importance of real time interfacing system in mechatronics. State different types of the interface system. 5
 - (d) Explain various controls involved in intelligent supervisory control system. 5
 - (e) There are two push buttons SW_1 and SW_2 , if any one is pressed motor ON for 10 minutes then switch OFF and switch ON heater for 5 minutes. Stop buttons SW_3 and SW_4 are provided individually to stop motor and heater. Draw the ladder diagram and explain its logic. 5
2. (a) Explain mechatronics design process in details with diagram. 10
(b) Compute the block diagram representation for following electrical circuit. 10

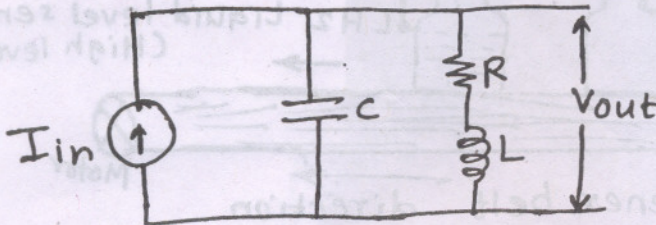
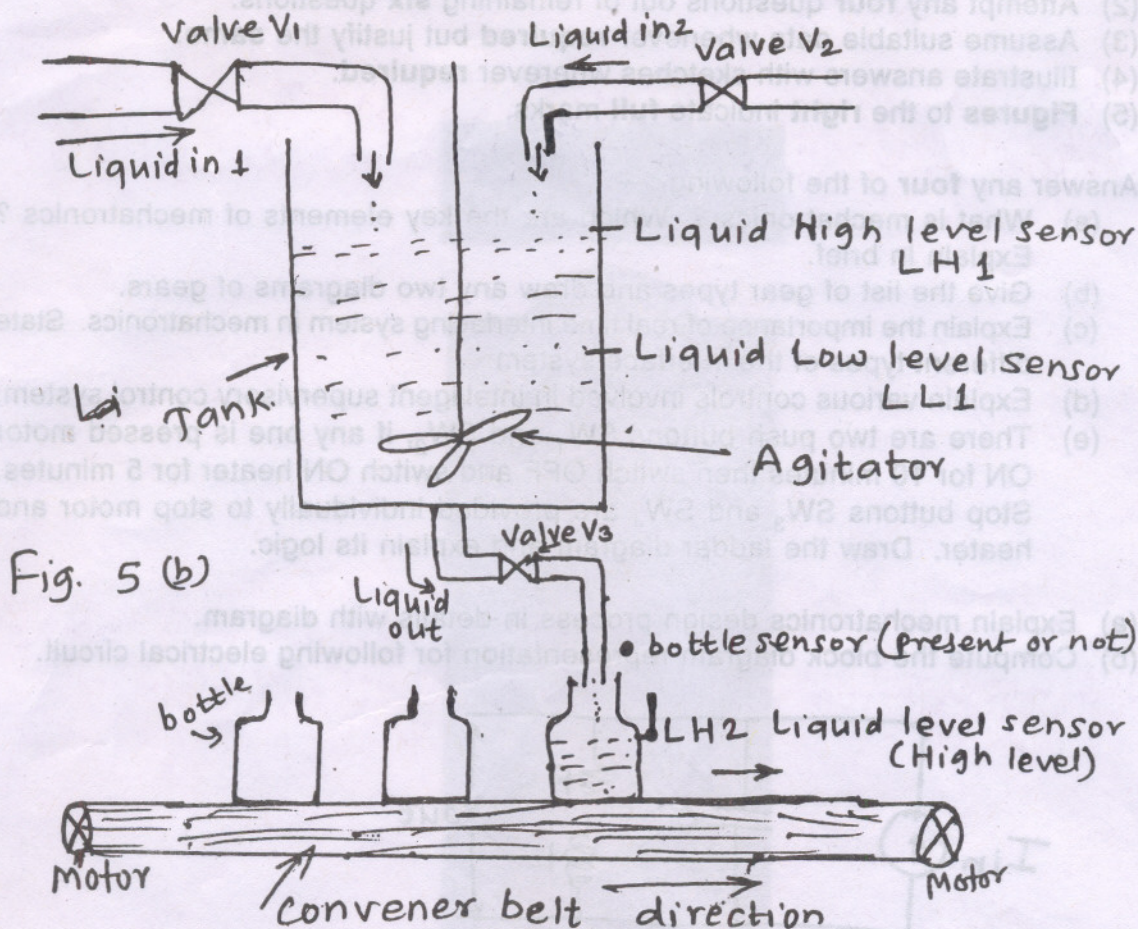


Fig. 2(b)

- 3. (a) Explain construction and operation of brushless DC motor. 10
(b) Explain major components of Data Acquisition and Control System. 10
- 4. (a) Explain the basic principle of piezoelectric transducer. Derive the expression for voltage. Draw mechanical diagram of piezoelectric accelerometer. 10
(b) Explain any one application for fiber optic device in mechatronics. 10

5. (a) Explain PLC with the help of block diagram. Also explain selection procedure and features of PLC. 8
- (b) Draw the ladder diagram and explain logic for following automated bottling plant as shown in figure 5(b). 12



As start push button pressed following process start.

- (i) If liquid level below LH1 sensor valve V_1 and V_2 open otherwise close.
 - (ii) If liquid level above LL1 sensor agitator ON otherwise OFF.
 - (iii) Valve V_3 opens when liquid level above LL1 sensor and bottle is present below valve V_3 but it should be empty or liquid level in bottle below LH2 sensor.
 - (iv) If liquid level in bottle touches to LH2 sensor conveyor belt motor start and when next empty or liquid level in bottle below LH2 sensor comes conveyor belt motor stops.
6. (a) Explain P, PI, PD, PID controller with the help of circuit diagram. Also draw the output waveforms for step input and ramp input. 12
- (b) What is adaptive control system? Compare the performance of different types of adaptive control system. 8
7. Write short notes on any four :—
- (a) Various properties of sensor 5
 - (b) Fuzzy logic 5
 - (c) Various tunings methods of PID 5
 - (d) Stepper motor 5
 - (e) Fluid power circuit. 5