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END TERM EXAMINATION

SEVENTH SEMESTER [B.TECH.] DECEMBER 2017

Paper Code: ETAT-403

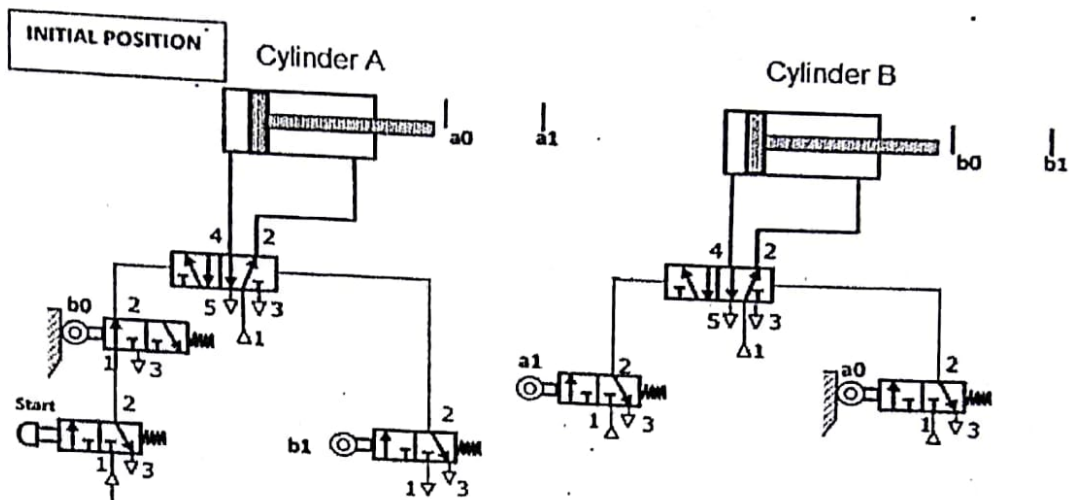
Subject: Mechatronics

Time: 3 Hours

Maximum Marks: 75

Note: Attempt any five questions including Q No. 1 which is compulsory. Select one question from each unit. Assume suitable missing data if any.

- Q1 Answer the following questions briefly (5x5)
- (a) For the pneumatic circuit as shown below what will be the sequence of actuation in terms of A+, A-, B+, B-.



- (b) Solve the K map for the following expression
 $f(A,B,C) = \sum m(1,2,3,6)$
- (c) An 8 cm diameter hydraulic cylinder has a 4 cm diameter rod. If the cylinder receives the flow at 100 LPM and 12 MPa. Find
- (i) Extension speed (ii) Retraction speeds
(iii) Extension load carrying capacity (iv) Retraction load carrying capacity
- (d) Write a PLC ladder program as per the following information
- PLC Inputs
X - START pushbutton to start motor
Y - STOP pushbutton to stop motor
PLC Output
Z - Single phase motor
- (e) Explain in brief the working principle of an electromagnetic relay.

UNIT - I

- Q2 With a neat sketch explain the working of a Ratchet and Pawl mechanism. Explain any one application in brief.
- Q3 What do you understand by a control valve in a pneumatic system? Explain the different control valves available in a pneumatic system with a suitable diagram for each. (12.5)

UNIT - II

- Q4 Briefly explain the different motors that are commonly used in a mechatronic system with their characteristics. Also list 2 applications of each of them. (12.5)
- Q5 (a) Briefly explain the different mechanical switches used in a mechatronics system- SPST, SPDT, DPDT. (6.5)

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- (b) Differentiate between a microcontroller and microprocessor. (3)
- (c) Write in brief one method for controlling an AC motor. (3)

UNIT-III

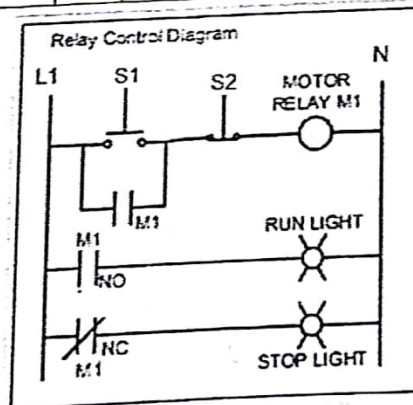
- Q5 (a) With the help of a neat circuit diagram explain the working principle of an analog to digital converter. (8.5)
- (b) Write **any two** applications of the following sensors:-
- (i) Hall effect sensor
 - (ii) LVDT
 - (iii) Strain gage
- (4)

- Q6 (a) With the help of neat circuit diagrams explain the different operational amplifiers which are used in a mechatronics system. (8.5)
- (b) List the various static and dynamic characteristics that need to be carefully studied before selecting a sensor for an application. (4)

UNIT-IV

- Q8 (a) Explain the basic architecture of a PLC in detail. (7.5)
- (b) In the PLC ladder program as shown below, determine for how long the light glows and remains off in an interval of 30 sec. The following sequence of switches is pressed as illustrated in the table. Redraw the table in your answer sheet and fill in the blanks too. (5)

Time from t=0 (sec)	0	3	7	13	15	20	23	25	30
Switch pressed	S1	S1	S2	S1	S2	S2	S2	S1	S2
Light ON / OFF									



- Q9 What is ladder programming in a PLC? With neat illustrations explain how you will obtain the following logic functions by using combinations of switches and also draw their corresponding ladder programs? (12.5)
- (a) AND.
 - (b) OR
 - (c) NOR
 - (d) NAND

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SEVENTH SEMESTER [B.TECH] DECEMBER 2015

Paper Code: ETME-403

Subject: Mechatronics

Time: 3 Hours

Maximum Marks: 75

Note: Attempt any five questions including Q.no.1 which is compulsory.
Select one question from each unit.

Q1 Short answer type questions: (5x5=25)

- (a) Explain solid state switches
- (b) Describe Kinematic chain
- (c) Explain shift Registers
- (d) Describe Master and jump control
- (e) Explain pulse Modulation

Unit-I

- Q2 (a) Explain the construction and working of Direction Control Valves with diagram. (6.5)
(b) Discuss the working of Ratchet Mechanism with diagram and applications. (6)

Q3 What is the function of Actuators. Explain the construction and working of different types of Actuators with neat and clean diagram along with merits, demerits and applications. (12.5)

Unit-II

- Q4 (a) Discuss the working of Solenoid Operated Hydraulic and Pneumatic Valves with diagram. (6.5)
(b) Explain the working of Permanent Magnet DC Motors with applications. (6)
- Q5 (a) Explain the construction and working of Servo Motors with neat diagram and application. (6.5)
(b) Explain the concept of Thyristor and Transistor with examples. (6)

Unit-III

- Q6 (a) Explain the Serial and Parallel Port Interfacing with neat diagram. (6.5)
(b) Discuss Boolean Algebra and explain Gates and Integrated Circuits with suitable examples and applications. (6)
- Q7 (a) Explain the construction and working of Digital Comparators with diagram. (6.5)
(b) Discuss the working of LVDT with neat diagram and also mention its merits, demerits and applications. (6)

Unit-IV

- Q8 (a) Describe the construction and operation of a Pneumatic Sensors and Hall Effect Sensors with diagram. (6.5)
(b) Explain the working of Tachogenerators along with merits and demerits. (6)
- Q9 (a) Discuss the construction and working of Wheatstone Bridge with neat diagram and applications. (6.5)
(b) Explain the Logic Functions, Latching and Sequencing with suitable examples. (6)

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SEVENTH SEMESTER [B.TECH] DECEMBER-2014 - January 2015

Paper Code: **ETME-403**

Subject: **Mechatronics**

Time: **3 Hours**

Maximum Marks: **75**

Note: Attempt any five questions including Q.no.1 which is compulsory.
Select one question from each Unit.

- Q1 Write short notes on the following:- (5x5=25)
- (a) Hydraulic Cylinder
 - (b) Solenoid
 - (c) Micro-controller
 - (d) Load Cell
 - (e) Bar Code Reader

Unit-I

- Q2 (a) Define mechanism and state the difference between a mechanism and a machine, giving at least one example in each case. (6)
- (b) Example the working mechanism and application areas of hydraulic actuator. (6.5)
- Q3 (a) Discuss the magnetic bearing. What are the merits of a magnetic bearing? (6)
- (b) What are cam and followers? Compare radial and cylindrical types of cam. Give some application of cams. (6.5)

Unit-II

- Q4 (a) What is the principle of operation of photo-electric transducer? Discuss photovoltaic cell with a neat diagram, given its field of application. (6.5)
- (b) Discuss photoelectric tachometer giving its advantages and disadvantages. (6)
- Q5 (a) Define the term integrated circuit (IC). Write about its importance in automation and control. (6)
- (b) Describe construction and working of a stepper motor and its applications. (6.5)

Unit-III

- Q6 What is an optical encoder? Describe the construction and working of an incremental encoder, with the help of a schematic diagram. (12.5)
- Q7 Explain the working of a summing amplifier with the help of a neat diagram. Also derive its gain equation. (12.5)

Unit-IV

- Q8 (a) Explain briefly a mathematical model of a car moving on a road. (6.5)
- (b) How is the model for a thermal system built up? Explain. (6)
- Q9 (a) Explain about the programmable logic controllers (PLCs). State the advantages and uses of PLCs. (6.5)
- (b) Briefly explain the following:- (6)
- (i) Timers
 - (ii) Internal Relays
 - (iii) Counter
 - (iv) Shift registers:

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