

**University Institute of Engineering & Technology**

*(Recognised Under Section 2(f) and 12B of UGC)*

**Kurukshetra University, Kurukshetra**

**TIME – 3 Hrs 15 Min**

<b>THEORY EXAMINATION –JAN 2021</b>	
<b>B.TECH – Mechanical</b>	<b>SEMESTER - VII</b>

**M.M. - 56**

**PAPER - ME- 403**

**SUBJECT- MECHATRONICS**

**INSTRUCTIONS TO BE FOLLOWED**

- Allotted time for examination is 3 hours 15 minutes that includes time for downloading the question paper, writing answers, scanning of answer sheets and E-mailing the PDF files to the designated Email ID.
- For all B Tech. Mechanical Engineering Students, the Email ID is:- [btechmechuiet@kuk.ac.in](mailto:btechmechuiet@kuk.ac.in)
- The candidates will be required to attempt 75% of the question paper (maximum) by choosing to their any best questions accumulating 56 marks.
- The PDF files should be saved as Roll No. and Subject Code. Proper attention should be given while sending the email and in the subject line, the Roll Number and Subject Code should be mentioned.
- Maximum Page Limit should be 20 (Twenty) for attempting the question paper on A4 sheets which could be downloaded and printed from the sample sheets given in the Kurukshetra University Examination guidelines.
- Over-attemptation should be avoided.
- Handwriting should be neat and clean and diagrams should be clear and contrasted.
- The candidate should not write their Mobile No. otherwise Unfair Means Case will be made.
- While attempting the paper, the candidate will use blue/black pen only.
- Before attempting the paper, the candidate will ensure that he/she has downloaded the correct question paper. No complaint for attempting wrong question paper by the candidate will be entertained.
- Candidate must ensure that he/she has put his/her signature on each page of the answer sheet used by him/her. Answer sheet without the signature of the candidate will not be evaluated.

**PART-A**

**Q. No. – 1 Answer the following questions.**

**15x1=15**

(i)	Add hexadecimal number 2EC and 3A4
(ii)	Convert to POS from $F = xy + \bar{x}z$
(iii)	Solve $(245)_8 = (---)_{10}$ and $(A6F)_{16} = (---)_2$
(iv)	Give practical examples for closed loop system and open loop system?
(v)	Distinguish between parallel and serial data transfer.
(vi)	Identify the objective of potentiometer in displacement sensor?
(vii)	List the various sensors contained in engine management system.
(viii)	Write the need of register in microcontroller.
(ix)	Draw a graphical symbol of 3 position 4 way solenoid energised pilot operated centre direction control valve
(x)	Differentiate between XIC and XIO instructions in ladder programming.
(xi)	Write the application of ratchet and pawl mechanism in mechatronics.
(xii)	What do you mean signal processing?
(xiii)	Draw the ladder diagram of Latch circuit.
(xiv)	What is meant by pitch, yaw and roll?
(xv)	What do you mean by program scan in PLC?

**PART-B**

<b>2</b>	Minimize the following Boolean Function $F(A, B, C, D) = \sum m(0,1,3,5,7,8,9,11,13,15)$	<b>5</b>
<b>3</b>	Interpret how displacement is sensed by LVDT. With neat sketch, explain the process.	<b>5</b>
<b>4</b>	Sketch and explain the working of Poppet Valve along with practical application.	<b>5</b>
<b>5</b>	Explain the four basic robot configurations available commercially	<b>5</b>

**PART-C**

<b>6</b>	Briefly design any two mechatronics systems with example.	<b>10</b>
<b>7</b>	a) $F = (A + B')(CD + E)$ using only NAND gates b) $F = A(B + CD) + BC'$ with only NOR gates c) $F = x'y + xy'$ using only four NAND gates	<b>10</b>
<b>8</b>	Two cylindrical parts of different height are produced and made to move in a conveyor and randomly placed. Tolerance in height is specified for both the parts. Give the schematic diagram for measuring the height of both the parts and counting them by the proper sensor.	<b>10</b>
<b>9</b>	a) Develop a sequencing circuit for a two double acting cylinder b) Classify and plan a directional control valves based on the neutral position with symbol.	<b>07</b> <b>03</b>

<b>10</b>	List and explain the various types of addressing modes in detail in 8085 microprocessors with examples for each.	<b>10</b>
<b>11</b>	a) Draw and explain the types of belts used in belt drives for power transmission. b) Discuss the application of suitable bearings in Mechatronics system.	<b>07</b> <b>03</b>
<b>12</b>	a) With a neat sketch, explain the working of magnetic gripper. List its advantages and limitations. b) How the robot end effector interface is achieved?	<b>06</b> <b>04</b>
<b>13</b>	Explain the component of PLC with a suitable block diagram	<b>10</b>