

**B.TECH. SEM -VII PRODUCTION 2014 COURSE (CBCS) :**  
**WINTER - 2017**  
**SUBJECT: MECHATRONICS AND MANUFACTURING AUTOMATION**

Day: **Wednesday**  
Date: **17/01/2018**

**W-2017-2320**

Time: **02.30 PM TO 05.30 PM**  
Max Marks: **60**

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**N.B.:**

- 1) All questions are **COMPULSORY**
  - 2) Figures to the right indicate **FULL** marks.
  - 3) Assume suitable data, if necessary.
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- Q.1 a)** Describe application of mechatronics in modern world. **(05)**
- b)** How do hall effect sensors differ from photoelectric sensors? **(05)**

**OR**

- Q.1 a)** A potentiometer resistance transducer has a total winding resistance of  $8K\Omega$  and maximum displacement range of 5cm. The power dissipation of maximum displacement is not to exceed 50KW. Determine output voltage of the transducer when input displacement is 2cm. **(05)**
- b)** Write down factors to be considered in selection of sensors. **(05)**

- Q.2** Explain dynamic response of second order system to ramp and step input. **(10)**

**OR**

- Q.2 a)** Write short note on stability of control system. **(05)**
- b)** How system response is determined? Bring out the various steps involved. **(05)**
- Q.3 a)** Describe the operation of instrumentation amplifier using diagram. **(05)**
- b)** Explain the term virtual instrumentation in data acquisition. **(05)**

**OR**

- Q.3** Write short note on: **(10)**
- a) Multiplexers
  - b) Analog to digital conversion.

- Q.4** Explain in details levels of automation in manufacturing industry plant. **(10)**

**OR**

- Q.4 a)** Explain an automated system consist of different basic elements. **(05)**
- b)** Describe advanced automation functions. **(05)**

**P.T.O.**

- Q.5** Balance the assembly line described in the following table whose rule of (10) production is 40units/hr. Calculate.
- 1) Cycle time.
  - 2) Theoretical minimum number of workstations.
  - 3) Idle time for each work station.
  - 4) Resulting efficiency and balance delay percentage.

| Work element | Time in sec. | Immediate predecessor |
|--------------|--------------|-----------------------|
| A            | 40           | -                     |
| B            | 80           | A                     |
| C            | 30           | A                     |
| D            | 25           | B                     |
| E            | 20           | C                     |
| F            | 15           | B                     |
| G            | 60           | B                     |
| H            | 45           | D                     |
| I            | 10           | E, G                  |
| J            | 75           | F                     |
| K            | 15           | H, I, J               |
| <b>Total</b> | 415          |                       |

**OR**

- Q.5 a)** Explain Cellular Manufacturing with its merits and limitations. (05)
- b)** Describe automated material handling system. (05)

- Q.6 a)** Develop and explain a ladder diagram for the following. (10)
- A motor is started with START button which is NO. The motor can be stopped by pressing the STOP button which is NC. A thermal overload switch is provided which opens on high temperature. A green light is ON while the motor is running. When there is thermal overload the motor is put OFF and red light indicating the thermal overload is put ON.

**OR**

- Q.6 a)** Explain computer based industrial controls. (05)
- b)** Describe Programmable Logic Controller (PLC). (05)

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