

B.TECH SEM – VIII (2007 COURSE) (MECHANICAL ENGG.)

: WINTER - 2017

SUBJECT: MECHATRONICS

Day : **Tuesday**
Date : **21/11/2017**

Time **02.30 PM TO 05.30 PM**
Max.Marks: 80

W-2017-2692

N.B.

- 1) **Q.NO1 and Q.NO.5 are COMPULSORY.** Out of remaining questions attempt **ANY TWO** questions from each section.
- 2) Figures to the **RIGHT** indicate full marks.
- 3) Answer to both sections should be written in **SEPARATE** answer books.
- 4) Use of non-programmable calculator is allowed.
- 5) Assume suitable data if necessary.

SECTION-I

- Q.1** Answer the following : (14)
- a) Discuss the effect of temperature on the “Transducer calibration” process.
 - b) List the parameters to be considered for designing an intelligent mechatronics system.
 - c) Elaborate the analog between mechanical and electrical system.
 - d) Define transfer function and write the transfer function for a closed loop system.
- Q.2** a) Explain working of full bridge strain gauge circuit used for temperature measurement. (07)
- b) A utility feedback system has $G(S) = \frac{k(s+1)}{s^2(s+2)(s+5)}$ (06)
- Using Routh- Hurwitz criteria find range of k for the closed loop system to be stable.
- Q.3** a) Differentiate an incremental shaft encoder and an absolute shaft encoder. (06)
- b) Draw and explain the block diagram of the digital camera auto focus system as an example of mechatronics system. (07)
- Q.4** a) Determine the outputs of first order system to step input and determine time constant. (07)
- b) Write a short note on the use of Rotameter for the measurement of flow rate (06)

SECTION -II

- Q.5** Answer the following: (14)
- a) Differentiate feedback and feed forward control system.
 - b) Write a short note on Schmitt trigger.
 - c) Define timers, counters and shift registers.
 - d) Explain D-flip-flop by using truth table.
- Q.6** a) List different control actions and explain working of PID controller mode. (07)
- b) Write a short note on decade counters. (06)
- Q.7** a) Write the ideal characteristics of Op-amp and draw Op-amp (pin) package and explain role of each terminal. (07)
- b) Write a short note on ADC. (06)
- Q.8** a) Write a PLC program to achieve following objectives with a START button (NO), STOP Button (NC) and a MOTOR (M) (07)
- a) When start button is pushed the motor should start and continue to be ON
 - b) When stop button is pushed the motor should turn off.
- b) State the selection criteria for PLC's. List the application of PLC in mechanical industries. (06)