**T 8197**

**ech.** DEGREE EXAMINATION, NOVEMBER/DECEMBER 2006.

Fifth Semester

Mechatronics Engineering

**EE 1311 — INSTRUMENTATION AND CONTROL SYSTEM**

(Regulation 2004)

**ee hours** Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

**at is the necessity for a variable conversion element in a measurement tem?**

**fine dead time element.**

**ate Planck's law.**

**hat is a black body?**

**what way a manometer differs from a piston gage?**

**tate the principle of operation of hot-wire anemometer.**

**Define gauge factor of a strain gauge.**

**What is a jerk?**

**Write the transfer function of a PID controller.**

**Draw the block diagram of a feedback control system.**

PART B — (5 × 16 = 80 marks)

11. (a) Derive expressions and plot the responses of a first order system for

(i) step input (8)

(ii) sinusoidal input. (8)

Or

(b) (i) From first principles derive an expression for the step response of a second order system. (8)

(ii) Plot the response and discuss the effect of damping factor. (8)

12. (a) (i) State and explain the laws of thermocouples. (8)

(ii) Write notes on the characteristics of Cromal-Alumel thermocouples. (8)

Or

(b) Describe with suitable diagrams the construction, equivalent circuit and features of a photodiode based radiation detector circuit. (16)

13. (a) (i) Explain the constructional details and principle of an electromagnetic flow meter. (8)

(ii) Describe the working of a Hot Wire Anemometer. (8)

Or

(b) Write notes on the various types and principle of operation of the following pressure transducers.

(i) Bourden Tubes. (8)

(ii) Diaphragms. (8)

14. (a) (i) With neat diagrams give an account of the different types of potentiometer transducers. (6)

(ii) With functional block diagram explain the working of LVDT and how it is used for displacement measurement. (10)

Or

(b) Write notes on the following :

(i) Optical encoders. (8)

(ii) Piezoelectric transducers. (8)

Draw the OP AMP circuit of an electronic PID controller and explain the operation. (16)

Or

With a block diagram discuss the control of speed mechanism adopted for speed control of electric drives. (16)

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