

GANPAT UNIVERSITY
B. TECH. SEMESTER – VI MECHATRONICS ENGINEERING
REGULAR EXAMINATION MAY – JUNE 2014
2MC605 SENSOR SYSTEMS

Time: 3 Hours

Total Marks: 70

- Instruction:**
- 1 All the questions are compulsory.
 - 2 Draw appropriate figures wherever necessary.
 - 3 Numbers at the right end of the question indicate marks.
 - 4 Write down each sections in separate answer books.

Section - I

- Que. – 1 Attempt following questions. [12]**
- (a) Explain Hall effect and Piezo resistive effect along with their application in sensors. (4)
 - (b) Enlist mechanical, electrical and thermal stimulus. (4)
 - (c) What is the difference between active and passive sensors? Enlist both. (4)

OR

- Que. – 1 Attempt following questions. [12]**
- (a) Explain photovoltaic and Photo resistive effect along with their application in sensors. (4)
 - (b) Enlist the application of change of capacitance and magnetism in detail with examples. (4)
 - (c) What is pulse width modulation? Explain with application. (4)

- Que. – 2 Attempt following questions. [11]**
- (a) Make a program in any high level language to find distance in CM using ultrasonic sensor. The speed of sound is 340 m/s or 29 microseconds per centimeter. (6)
 - (b) What is done to make absolute encoder quick responsive? Explain with figure and table. (5)

OR

- Que. – 2 Attempt following questions. [11]**
- (a) Draw the block diagram of system which uses 10 K Ω single turn potentiometer to measure angle. What should be the resolution of ADC to measure the angle with accuracy of 0.1 Degree? (6)
 - (b) Explain incremental encoder with figure and its application. (5)

- Que. – 3 Attempt following questions. [12]**
- (a) How the digital data is converted into analog one using resistor ladder? Explain with figure and write down its limitations. (4)
 - (b) Define sampling, quantization, encoding and aliasing in data. (4)
 - (c) Compare thermocouple, RTD and thermistor. (4)

Section – II

Que. – 4 Attempt following questions. [12]

- (a) Enlist various static characteristics of the sensor and explain precision, resolution, hysteresis and repeatability. (4)
- (b) Draw proper figure of high pass, low pass and band pass filter and write down equations. (4)
- (c) Explain instrumentation amplifier and write down equation of gain. (4)

OR

Que. – 4 Attempt following questions. [12]

- (a) What is the need of calibration in sensors ? Explain static calibration of any sensor. (4)
- (b) Explain the dynamic calibration of pressure sensor and temperature sensor. (4)
- (c) Discuss about any two sensors used in medical diagnostics. (4)

Que. – 5 Attempt following questions. [11]

- (a) Discuss the working of successive approximation ADC with figure. (6)
- (b) What is the key advantage of flash ADC ? Explain with figure. (5)

OR

Que. – 5 Attempt following questions. [11]

- (a) Explain dual slope ADC with figure. (6)
- (b) How Delta-Sigma ADC works ? Explain with figure. (5)

Que. – 6 Attempt following questions. [12]

- (a) What is MEMS? Explain any two MEMS in detail with figure. (4)
- (b) Derive the equation of gauge factor for strain gauge. (4)
- (c) Enlist the applications of sensor in automobiles. (4)

END OF PAPER