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Total Number of Pages: 02

B.TECH
PCME4403

7th Semester Regular / Back Examination 2015-16
MECHANICAL MEASUREMENT & CONTROL

BRANCH: Mechanical

Time: 3 Hours

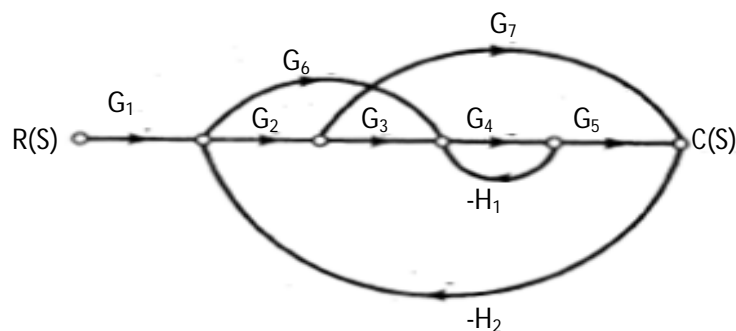
Max Marks: 70

Q.CODE: T703

Answer Question No.1 which is compulsory and any five from the rest.

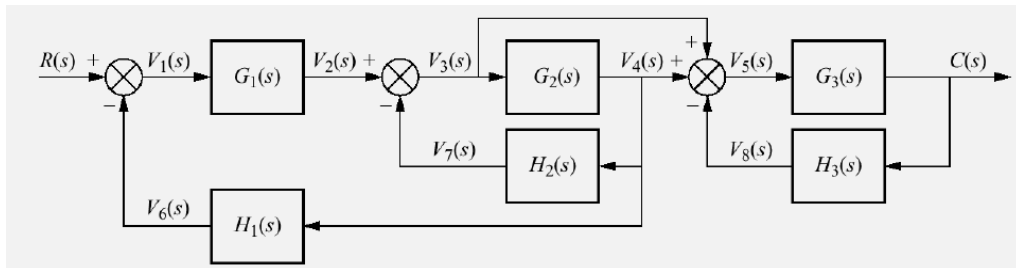
The figures in the right hand margin indicate marks.

- Q1** Answer the following questions: **(2 x 10)**
- a) What do you mean by open loop system and closed loop system? Explain briefly.
 - b) State classification of errors. How it affects performance of instrument?
 - c) What do you mean by Microprocessor based Instrumentation?
 - d) What do you mean by a Transducer? Explain with an example.
 - e) How the strain gauges are helpful for measurement? Give an example.
 - f) How the standards and calibration can be done for an Instrument.
 - g) What is Servo control System? How it is helpful in a Measuring Device.
 - h) What are the dynamic characteristics of pressure measuring systems?
 - i) Why the strain gauge ballast circuit is used. Explain.
 - j) Why Pitot tube is used for measurement. Explain.
- Q2**
- a) Explain about the functional elements of a measuring system with neat sketch. **(5)**
 - b) A single strain gauge having resistance of 120Ω is mounted on a steel cantilever beam at a distance of 0.15 m from the free end. An unknown force F applied at the free end produces a deflection of 12.7 mm of the free end. The change in gauge resistance is found to be 0.152Ω . The beam is 0.25 m long with a width of 20 mm and a depth of 3 mm. The young's modulus for steel is 200 GN/m^2 . Calculate the gauge factor. **(5)**
- Q3**
- a) What do you mean by static performance parameters? Explain briefly. **(5)**
 - b) For the control system whose signal flow graph is shown below, using Mason's formula, find the system transfer function $C(s)/R(s)$. **(5)**



Q4 Determine the Transfer function.

(10)



Q5 a) How the basic principles of LVDT, its construction, applications and limitations through diagrams. **(5)**

b) A horizontal venturimeter with inlet and throat diameters 30 cm and 15 cm respectively is used to measure the flow of water. The reading of differential manometer connected to the inlet and the throat is 20 cm of mercury. Determine the rate of flow. Take $C_d = 0.98$. **(5)**

Q6 a) Define Strain Rosette. How it is used for strain measurement? **(5)**

b) What are the different instruments available for Measurement of low pressures? Give an example with neat sketches and explanation. **(5)**

Q7 a) What do you mean by Dynamometer? Explain the Load Cell Dynamometers **(5)**

b) Why Rotameter is called as variable area flow meter? Draw its neat sketch. **(5)**

Q8 Write short notes on any two: **(5 x 2)**

- Accelerometers
- Use of bimetals pressure thermometers
- Routh's stability criterion.
- Bode Plot and Nyquist plot