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Total number of printed pages – 2

B. Tech
PCME4403

Seventh Semester (Special) Examination – 2013

MECHANICAL MEASUREMENT AND CONTROL

BRANCH : MECH

QUESTION CODE : D 482

Full Marks – 70

Time : 3 Hours

*Answer Question No. 1 which is compulsory and any **five** from the rest.
The figures in the right-hand margin indicate marks.*

1. Answer the following questions : 2 × 10
- (a) What is the difference between +ve and –ve feed back system ? Which one is stable.
- (b) Define a spring mass system with damping and differential equation and Laplace Transform of the equation with initial conditions.
- (c) Which parameters of an electrical circuit is analogous to mass, velocity, acceleration and displacement ?
- (d) Define the range of high pressure and low pressure.
- (e) What is the utility of Laplace Transform ? Find the Laplace Transform of an Impulse function.
- (f) On the s- plane show the region for stability. Why this region is stable ?
- (g) What is the advantage of Orifice meter for flow measurement ?
- (h) What are the different dissimilar materials used in thermocouples ? What is a P-type thermocouple ?
- (i) What is static and dynamic error?
- (j) What is the time domain response curve ?
2. (a) Explain Routh's Stability Criteria. The polynomial : 10
 $A(s) = s^7 + 2s^6 + 3s^5 + 4s^4 + 3s^3 + s^2 + s + 4$
Determine the stability criteria by using above criteria. Discuss.

P.T.O.

3. (a) Differentiate between a Variable area flow measurement with a constant area flow measurement 3
- (b) A rotameter is calibrated for metering a liquid of density 1050 kg/m^3 and a scale ranging from 1 to 200 litre/min. It is intended to use this meter for metering the flow of gas of density 1.25 kg/m^3 with a flow range from 20 to 2500 litre/min. Determine the density of new float, if the original has a density of 2000 kg/m^3 . The shape and volume of the float is assumed to be same. 7
4. With a neat sketch explain the working principle of a McLeod gage and Pirani Gage. 10
5. With a neat sketch explain the working principle of Total Radiation Pyrometer and Optical Pyrometer. 10
6. (a) What are the Laws of Thermocouple ? 4
- (b) Explain Seebeck, Peltier and Thomson effect. 3
- (c) Explain the working of Piezo-electric pressure transducer. 3
7. Derive the Gage Factor for a Resistance strain gage and sensitivity of a High Pressure Gage. 10
8. Write short notes on the following : 2.5×4
 - (a) Accuracy and Precision
 - (b) Uncertainty and Random error
 - (c) Sensitivity and Resolution
 - (d) Bode plot.

