Subject:- Mechanical Measurements | Max Marks:- 30

Duration:- 90mins | Minor:- 1

Branch:-B.E.(MECHANICAL), 5th Semester

Instructions:-All questions are compulsory. Assume missing data

1)

a) Define measurand with examples.
b) Differentiate between Maximum Possible and Maximum Probable error.
c) Draw and explain any non-contact method for measuring displacement.
d) Differentiate between Threshold and Resolution characteristic of a measuring instrument.
e) Draw and label to explain torsion/shear strain measuring system using strain gauges.

(2x5=10)

2) Design a strain gauges based plate system, that would be used by a human for diagnosing flat-feet disorder. This plate system would be used in standing position by a human and his/her feet pressure indication needs to be displayed on a screen for diagnosis. (4)

3) How many km does a bicyclist need to ride a bicycle, to fully charge a mobile phone battery having 5000mAh capacity, which is charged at 1% in 1min if his bicycle riding speed is 10km/hour constant? (4)

4) For a 2nd order instrument having natural frequency is 1000cps, damping ratio 60%, determine frequency range over which amplitude ratio corresponding to sinusoidal input deviates by maximum 10%. (6)

5) A steel based cantilever beam(500mm(L)x50mm(W)x15mm(D)) is attached with a full bridge Wheatstone bridge configuration having strain gauge resistance 100Ω, Gauge factor 2.0, supply voltage 6V. Find change in output voltage of the system, if the cantilever is subjected to 1kg load at the free end. (6)