

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
FOURTH SEMESTER B. TECH DEGREE EXAMINATION, JULY 2017  
IC208 MECHANICAL INSTRUMENTATION

Model Question Paper

Max. Marks: 100

Duration 3 Hours

PART A

*Answer any two out of three questions*

1. a). What is meant by direct method and indirect method of measurement? Why is direct method not preferred? (3)  
b). Draw the schematic diagram showing the functional elements of an instrumentation system with the help of an example. (4.5)  
c). What are the two methods of production of gears? State the sources of errors in each process. (3)  
d). What is constant chord method of measurement of tooth thickness? Explain with a neat sketch. (4.5)
  
2. a). What are interfering and modifying inputs? (3)  
b). Explain any three methods of correction for interfering and modifying inputs. (4.5)  
c). Describe the principle of working of an involute tester with the help of a figure. (4.5)  
d). How is concentricity of gear measured? (3)
  
3. a). Differentiate i) accuracy and precision, ii) repeatability and reproducibility. (3)  
b). What is meant by propagation of uncertainty? A certain resistor has a voltage drop of 110.2 V and a current of 5.3A. The uncertainties in the measurements are  $\pm 0.2V$  and  $\pm 0.06A$  respectively. Calculate the power dissipated in the resistor and uncertainty in power. (4.5)  
c) What is meant by run-out and backlash. (3)  
d) With the help of a neat sketch, define the terms pitch and lead. (4.5)

PART B

*Answer any two out of three questions*

4. a) Differentiate ideal and real fluids. (3)  
b) What is meant by surface tension? Derive expression for surface tension in a liquid droplet. (4.5)  
c). Sketch and describe the functions of various parts of a venturimeter. (3)  
d). Define coefficient of discharge and vena contracta. (4.5)
  
5. a). Define Newton law of viscosity. (3)  
b). Derive the expression for centre of pressure of an inclined plane surface submerged in liquid. (4.5)

- c) What are the different standard test signals used for time domain analysis? (3)
- d). Illustrate the two different modes of operation of hot wire anemometer and compare them. (4.5)
6. a). Derive Bernoulli's equation. (4.5)
- b) What are the different conditions of equilibrium of a floating body? Illustrate with figures. (3)
- c). State the advantages and disadvantages of Laser Doppler Anemometer. (3)
- d). Define the following terms: i. Speed of response  
 ii. Measuring lag  
 iii. Fidelity and  
 iv. Dynamic error (4.5)

### PART C

*Answer any two out of three questions*

7. a). Explain stroboscopic method of torque measurement with the help of a diagram. (4)
- b) What are the different types of dynamometers? (6)
- c) What is meant by wringing? Explain the procedure using figures. (4)
- d). How is sine bar used for checking unknown angles. (6)
8. a). What are load cells? Explain the working of a load cell using strain gauge. (5)
- b). Describe the working of an LVDT accelerometer with figure. (5)
- c) What is meant by primary texture and secondary texture? (4)
- d). Explain the working of Talysurf using a figure. (6)
9. a). Describe the working of a strain gauge accelerometer. (4)
- b) Distinguish among travelling, standing and constant pressure sound fields. (6)
- c) How is surface finish measured using Profilograph? (6)
- d) What are the various sources of errors while using sine centre? (4)