* K C - 6 2 6 9 *

KC-6269

B. E. - II (Sem. III) Examination

November / December – 2012

Mechanical Measurements

Time : **3** Hours] [Total Marks : **100**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ B. E. - 2 (SEM. 3)

Name of the Subject :

☛ MECHANICAL MEASUREMENTS

☛ Subject Code No. : 6 2 6 9 ☛ Section No. (1, 2,.....) : NIL

Seat No. :

Student's Signature

(2) Attempt all questions.

(3) Assume suitable data if required.

(4) Figures to the right indicate full marks of the question.

1 (a) Answer the following questions : **10**

(1) Depending upon the degree of complexity, the instrumentation systems are categorized as _____, _____ or _____ instrumentation system.

(2) The measurement of static pressure by Bourdon tube gauge is a _____ instrumentation system.

(3) _____ is the smallest increment of the measure and which can be detected with accuracy by the instrument.

(4) The initial response at the output of a system to a sinusoidal input signal will be _____ in nature.

(5) _____ errors are indicated when repeated measurements of the same quantity result in differing values.

(6) _____ errors are created due to incorrect and improper application and faulty installation.

(7) The standard method of calibrating any pressure gauge is to use _____.

(8) The turbine meter measures _____ velocity of flow.

(9) Semiconductor resistors used for temperature measurement are called _____.

(10) Define measurement.

(b) What is calibration and why is it necessary for an instrument? How do you proceed to draw the calibration curve, a correction curve and an error curve. **5**

(c) What are the different sources of errors in measurement and measuring instruments ? **5**

2 (a) (1) Explain Diaphragm gauge. **5**

(2) Explain absolute, gauge and vacuum pressure. Also give different units of pressure and their relations. **5**

(b) The differential pressure across an obstruction in a water filled pipe has been measured by a U tube mercury manometer. If the difference in the mercury level in the two limbs is 50 mm, make calculations for the differential pressure being measured. What error would be introduced by neglecting the water density in the limbs. Density of water = 1000 kg/m^3 and density of mercury = 13560 kg/m^3. **5**

OR

2 (a) Explain construction of venturi flow meter with neat sketch. **5**

(b) Explain different temperature scales. **5**

(c) A pitot static tube was used to measure the velocity of water at the centre of a 2.5 cm diameter pipe. The difference between the stagnation and static pressure head was indicated to be 8.5 cm of water. Calculate the flow velocity. Take velocity coefficient C_v = 1. If the mean flow velocity is presumed to be 0.67 of the velocity at the centre, compute the discharge of water through the pipe in m^3/ sec. **5**

3 Attempt any **three** : **15**

(1) Thermistor

(2) Mcleod Pressure gauge

(3) Quantity type flow meter explain any one in detail

(4) Flow Nozzle.

4 (a) Answer the following : **10**

(1) Speed of a sealed compressor unit can be measured by a

(a) Stroboscope

(b) Vibrating reed tachometer

(c) Capacitive pick-up tachometer

(d) Techoscope

(2) For the semi-conductor gauge, most of the resistance change due to applied strain comes from

(a) Length change

(b) Area change

(c) Resistivity change

(d) All of the above

(3) The seismic mass transducer for the measurement of acceleration and vibration is

(a) Zero order instrument

(b) First order instrument

(c) Second order instrument

(d) None of these

(4) Tachometers are used to measure

(a) Displacement

(b) Angular velocity

(c) Vibration

(d) Time

(5) A pressure thermometer is used to measure

(a) Temperature

(b) Force

(c) Vibration

(d) None of the above

(6) The average speed measurement are given by

(a) Centrifugal tachometer

(b) Drag cup tachometer

(c) Revolution counter and a timer

(d) Stroboscope

(7) Proving ring is used to measure

(a) Force

(b) Vibration

(c) Velocity

(d) None of the above

(8) The stroboscopic method of speed measurement has the advantage that

(a) The method is simple

(b) Multiples of angular speed can be measured

(c) Physical contact between the instrument and rotating shaft is not required

(d) A stationery image can be observed

(9) Piezoelectric type of load cells can be used for measurement of

(a) Dynamic forces only

(b) Dynamic forces and static forces provided that load cell has small time constant

(c) Dynamic forces and static forces provided that load cell has large time constant

(d) None of the above

(10) In a saybolt viscometer, the viscosity can be measured by measuring the time to fill a flask with liquid volume equal to

(a) 50 ml

(b) 200 ml

(c) 60 ml

(d) 10 ml

(b) Write short notes : **10**

(1) Hydraulic load cell

(2) L.V.D.T

5 (a) Explain with neat sketch working of Eddy current dynamometer. **5**

(b) Explain rope brake dynamometer with neat sketch. **5**

OR

(b) A metallic resistance strain gauge of 100 Ω resistance with gauge factor of 2 is cemented to an aluminium test surface. If the yield stress is 2×10^3 kgf/cm^2 and modulus of elasticity is 0.75×10^{-6} kgf/cm^2, determine the change in resistance of the gauge caused by loading the material to yield point. **5**

(c) Explain wheatstone bridge circuit **5**

OR

(c) Explain construction and working of a radiation pyrometer. **5**

6 Attempt any **three** : **15**

(a) Pneumatic load cell

(b) Orsat apparatus

(c) Strain gauge

(d) Gas chromatograph

(e) Tachometer