Registration No : | | | | | | | | | | |

Total Number of Pages : 02 **B.Tech.**
PME4I104

4th Semester Regular / Back Examination 2017-18
MECHANICAL MEASUREMENT, METALLURGY & RELIABILITY
BRANCH : MECH
Time : 3 Hours
Max Marks : 100
Q.CODE : C902

Answer Part-A which is compulsory and any four from Part-B.
The figures in the right hand margin indicate marks.
Answer all parts of a question at a place.

Part – A (Answer all the questions)

Q1 **Answer the following questions : *multiple type or dash fill up type :*** **(2 x 10)**

a) When measurement is made between two flat parallel surfaces, it is called
(a) Line measurement (b) Direct measurement
(c) Standard measurement (d) End measurement

b) The relationship that results between the two mating parts before assembly is called
(a) Tolerance (b) Limit
(c) Allowance (d) Fit

c) Semiconductors used for temperature measurement are called
(a) Thermistors (b) Thermopiles
(c) Resistance temperature detectors (d) Pyrometers

d) McLeod gauge works on
(a) Newton's law (b) Hook's law
(c) Boyle's law (d) Pascal's law

e) When pressure is applied onto the diaphragm, the distance between the two metal plates changes, which in turn changes the
(a) Capacitance (b) Inductance
(c) Resistance (d) Reluctance

f) The metal extensively used in high-accuracy resistance thermometers is
(a) Rhodium (b) Nickel
(c) Iridium (d) Platinum

g) The materials used in the manufacture of thermistors are
(a) Oxides of manganese and cobalt (b) Oxides of iron and zinc
(c) Carbides of silicon and germanium (d) All of these

h) In a slip gauges a protector is provided to
(a) Clean the slip gauges
(b) Take up all the wear when in use
(c) Protect the slip gauges when not in use
(d) Assemble the slip gauges properly

i) A negative allowance will always result in a _____ fit.
(a) Clearance (b) Interference
(c) Transition (d) Any of the above

j) The reliability of an instrument mean
(a) The life of the instrument
(b) The degree of repeatability within specified limits
(c) The time interval between two responses of the instrument
(d) None of these

Q2 **Answer the following questions : *Short answer type :*** **(2 x 10)**

a) Distinguish between direct and indirect measurements with two examples of each.

b) What is pyrometer and where is it used?

c) Define sensitivity in measuring system.

d) How accuracy differs from precision?

e) What is the function of Dynamometer? How it is benefited in the measuring systems?

f) Define interchangeability.

g) Explain briefly bath-tub-curve.

h) Why Vibrometers and accelerometers are used? Write down the applications.

i) How you have differentiate between Analog Transducer and Digital Transducer?

j) Explain briefly circularity.

Part – B (Answer any four questions)

Q3 **a)** Define systematic errors and random errors. Differentiate between systematic errors and random errors. Discuss the different reasons for the occurrence of systematic errors and random errors. **(10)**

b) Differentiate between line and end standards. **(5)**

Q4 **a)** Discuss geometric tolerances. Explain different types of geometric tolerances and symbolically represent them. **(10)**

b) Define fits and with the help of neat sketches, explain different types of fits. **(5)**

Q5 **a)** Discuss the working principle of thermocouple. What are the advantages and limitations of thermocouple sensors? **(10)**

b) With a schematic diagram, explain the working of a pressure thermometer. **(5)**

Q6 **a)** List all the gauges used for low pressure measurement and briefly discuss about their working. **(10)**

b) Discuss the working of a Bourdon gauge with a neat sketch. **(5)**

Q7 **a)** Define gauge factor. Explain the wheat stone bridge arrangement for strain measurement. **(10)**

b) Explain the construction and working principle of Turbine flow meter. **(5)**

Q8 **a)** Give the complete classification of transducers. **(10)**

b) Define Reliability analysis systems. Explain the procedures to improve the reliability. **(5)**

Q9 **Write short notes on any THREE :** **(5 x 3)**

a) Calibration

b) LVDT

c) Load cells

d) Pitot tube