

Seat No.	
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T.E. (Mechanical) (Part-III) (Semester-VI) (Revised)
Examination, May - 2018
METROLOGY AND QUALITY CONTROL
Sub. Code : 66839

Day and Date : Tuesday, 08 - 05 - 2018

Total Marks : 100

Time : 2.30 p.m. to 5.30 p.m.

- Instructions :
- 1) All questions are compulsory.
 - 2) Figures to right indicate full marks.
 - 3) Draw Neat Labeled Sketch Wherever Necessary.
 - 4) Assume Any Data If Necessary and State It Clearly.

Q1) Solve any two of the following: [18]

- a) Explain the terms with neat sketch:
 - i) Wear allowance
 - ii) Limit gauge
- b) Explain with neat sketch the types of fits and its application.
- c) Find out the two limits for a hole and shaft pair designated as 60 H7 m 7 with following data and state the type of fit.
 - i) 60 mm lies between dia. steps of 50-80 mm
 - ii) i - is standard tolerance unit = $0.45D^{\frac{1}{3}} + 0.001D$
 - iii) For grade IT7 tolerance = $16i$
 - iv) Fundamental deviation of m shaft (IT7 - IT6), IT6 = $10i$
 - v) Fundamental deviation of H-hole = 0

Q2) Solve any two of the following: [16]

- a) State advantage and disadvantages of mechanical comparator over pneumatic comparator.

P.T.O.

b) A set of angle gauges consist of the following gauges

i) $1^\circ, 3^\circ, 9^\circ, 27^\circ, 41^\circ, 90^\circ$

ii) $1', 3', 9', 27'$

iii) $3'', 6'', 18'', 30''$

Select suitable angles gauges required to build the following angles:

1) $11^\circ 22'$

2) $28^\circ 36' 15''$

3) $43^\circ 41' 27''$

4) $98^\circ 24' 15''$

c) State the essential requirements for accuracy in the construction of sine bar. How use sine bar angle measurement? Why use of sine bar is not recommended for angle larger than 45° .

Q3) Solve any two of the following:

[16]

- State the principle of interferometry and explain with neat sketch N.P.L. Interferometer.
- Explain principle, construction and working of Taylor Hobson Talysurf with neat sketch.
- What is the straight edge? Explain with neat sketch use of straight edge for checking flatness and straightness.

Q4) Solve any two of the following:

[16]

- How will you measure the following elements of spur gear?
 - Run out
 - Tooth profile
- Derive an expression for effective diameter measurement by 3-Wire method for external threads.
- Define the pitch of screw thread and describe the use of pitch measuring machine with a neat sketch.

Q5) Solve any two of the following:

[16]

- Explain the concept of quality; give objectives and importance of quality control.
- How failure, prevention and appraisal cost is related to each other? Explain with Graphs.
- What is quality control? What are different tools used to solve the quality control issues? Explain two of them with an example.

Q6) Solve any two of the following:

[18]

- Discuss advantages and limitations of 100% inspection and sampling inspection.
- Explain the importance of statistical method in quality control and also explain characteristics of normal distribution curve.
- A machine is working to a specification 12.58 ± 0.05 mm a study of 25 consecutive pieces shows the following measurements. Construct the \bar{X} and R chart; calculate process capability and Comment on the process (For sample size of 5 take $A_2 = 0.58$, $D_4 = 2.11$, $D_3 = 0$, $d_2 = 2.326$).

1 st day	2 nd day	3 rd day	4 th day	5 th day
12.54	12.58	12.61	12.57	12.57
12.58	12.57	12.60	12.61	12.60
12.62	12.60	12.64	12.56	12.62
12.56	12.60	12.58	12.59	12.61
12.59	12.61	12.64	12.59	12.58

