

Answer All Questions

Question One :-(24marks)

- a) Define The Following Items:- Clearance fit – Interference fit – fundamental deviation –upper deviation
max. clearance - max. metal condition - min. metal condition. (7marks)
- b) Explain the following items:- the different types of engineering tolerances - hole basis system – shaft basis system – limits – allowance. (8marks)
- c) What are limit gauges? Sketch and explain any two types of limit gauges and explain the third system (British system) for design of limit gauges. (9marks)

Question Two:- (26marks)

- a) Distinguish between a measuring instruments and limit gauges and explain why a GO gauge should be of a full form and NOT GO gauge should check only one dimension. (6marks)
- b) What is the drawing symbols for the following engineering tolerances:- (7marks)
- Flatness - Roundness - position - parallelism - Straightness - Radial run-out - Cylindricity.
- c) Design the general type GO and NOT GO gauges for component having 80mm H7/f8 fit. being given with usual notation:- (13marks)

$$i=0.45 \sqrt[3]{D} +0.001D$$

the upper deviation for shaft =- 5.5D^{0.41}

80 mm falls in diameter step of 50 and 80 mm. Also determine the type of fit.

(takeIT7=16i and IT8=25i)

Question Three:- (26marks)

- a) Define the following items :- (8marks)
- Surface texture - assessment length - lay - sampling length - cut-off length - center line average(R_a)
- b) Describe (with aid of sketches)-how the flatness of a surface plate, approximately 800 x 600 mm. in size, may be tested by means of a dial gauge. (8marks)
- c) The departure from straightness of a straight edge 1.0 meter was tested by dial gauge. the straight edge was supported at the points for minimum deflection and the readings(in div.) were:-
0 & +0.6 & +0.9 & -0.2 & 0 & +0.9 & +0.4 & -0.2 & 0 & -0.4 & +1.1 (one div.=0.01 mm)
Plot the graph in micrometers , and deduce the graph to show errors from a straight line through the points of support. (10marks)

Question Four:- (24marks)

- a) What is meant by best size wire? Determine the best size wire for a screw thread M 60x2 mm. (6marks)
- b) In measuring the effective diameter of a M24x3 mm. , the averages of the reading taken were as follows:-
- Micrometer reading over standard cylinder = 12.933 mm.
 - Micrometer reading over screw thread = 12.110 mm.
 - Diameter of standard cylinder = 22.0 mm.
 - Diameter of wires = 1.732 mm.
- Calculate the effective diameter of the thread. (8marks)
- c) Show by diagrammatic sketches and brief description how you would perform the following alignment tests:- (10marks)
- Squariness of lathe cross travel slide to the spindle axis.
 - Tailstock quill movement parallel to lathe axis.
 - Table surface of the milling machine parallel to the guide ways.
 - Spindle and feed movement of drilling machine square with base plate(m/c table).

*With my best wishes
Prof. Dr. I. M. Elewa*