B.E. (MECHANICAL ENGINEERING) 4TH YEAR 1ST SEM. EXAMINATION, 2019

Subject: QUANTITY PRODUCTION METHODS

Time: Three hours   **Full Marks: 100**

Answer any FIVE questions

1a) What do you mean by 'Job Shop Production System'?. Mention advantages and disadvantages of this type of production system'.   (2+6)

b) Consider any manufacturing company and identify the different components considering this as a production system.   (12)

2a) Show the followings with a neat sketch with reference to a hole and a shaft: (8)

Allowance, Upper deviation, Fundamental deviation, Tolerance zones

b) Differentiate between 'accuracy' and 'precision' with appropriate example.   (6)

c) Show with a sketch the different types of fit considering 'hole basis' system.   (6)

3a) Explain the statistical basis of tolerance.   (4)

b) A hole and a shaft have a basic size of 25 mm and are to have a clearance fit with maximum clearance of 0.02 mm and a minimum clearance of 0.01 mm. The hole tolerance is to be 1.5 times the shaft tolerance. Determine the limits of both hole and shaft (i) using a hole basis system (ii) using a shaft basis system.   (6)

c) Calculate the fundamental deviation and tolerances and hence the limits of size for the shaft and the hole for the fit "65 mm H8/f7''. The diameter steps are 50 mm and 80 mm. The fundamental deviation for shaft can be taken as ' - 5.5$D^{0.41}$ '. D bears usual meaning.   (10)

4a) Explain 'single limit' and 'double limit' gauges with appropriate sketches.   (8)

b) Shafts of 75±0.02 mm diameter are to be checked with the help of a 'GO' and 'NOT GO' snap gauges. Design the gauge, sketch it and show its go size and not go size dimensions both for unilateral and bilateral system. Assume wear allowance as 5% and gauge maker's tolerance as 10%.   (12)

[Turn over

5a) How will you find out Break-Even point using graphical method? What are the uses of Break-Even Point analysis ? (6+4)

b) The following data refer to a manufacturing unit:

Fixed cost = Rs. 100000; Variable cost = Rs 100 per unit; Selling price = Rs. 200 per unit.

(i) Calculate break-even point (ii) If the fixed cost increases to Rs. 125000 and variable cost reduces to Rs. 90 per unit, obtain new break-even point (iii) Calculate the number of components needed to be produced to get a profit of Rs. Rs. 20000. (10)

6a) Derive the expression for the time required on the shaper to complete one cut. Assume necessary notations. (10)

b) Estimate the time required on the shaper to complete one cut on a plate 600 mm × 900 mm, if the cutting speed is 6 m/min. The return time to cutting time ratio is 1 : 4 and the feed is 2 mm/stroke. The clearance at each end is 75 mm. (10)

7a) Describe the importance of 'Powder metallurgy' in manufacturing. (6)

b) Explain the different steps followed in powder metallurgy process. (8)

c) Mention advantages and limitations of powder metallurgy. (6)

8. Write short notes (any four): (4 × 5)

a) Flow production system

b) Selection of production system

c) Interchangeability

d) Wear allowance in gauge design

e) Break-even point

f) Sintering in powder metallurgy

g) Types of clearance fit