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R16

Code No: 135BE

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year I Semester Examinations, December - 2019

METROLOGY AND MACHINE TOOLS  
(Mechanical Engineering)

Max. Marks: 75

Time: 3 Hours

Note: This question paper contains two parts A and B. Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b as sub questions.

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PART - A (25 Marks)

- 1.a) Explain the conditions favoring the use of negative back rake angle on a single point cutting tool. [2]
- b) Differentiate between capstan and turret lathe. [3]
- c) Give the specification of boring machine. [2]
- d) Explain how to and fro motion is imparted to the ram in shaper. [3]
- e) Write about the materials used for broaching tools. [2]
- f) Define lapping? Compare lapping with honing and grinding. [3]
- g) Explain the need for the use of tolerance. [2]
- h) Differentiate between hole basis and shaft basis system. [3]
- i) Differentiate between roughness and waviness. [2]
- j) List out the applications of CMMs. [3]

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PART - B (50 Marks)

- 2.a) Explain the geometry of chip formation with proper sketches and equations.
  - b) What is an automatic machine? State the factors, which effect the classification of automatic machines. [5+5]
- OR
- 3.a) Briefly discuss about Geometry of single point cutting tool? Also, explain the following i) rake angle ii) Clearance angle iii) cutting angle iv) lip angle, with neat sketch. [5+5]
  - b) Briefly discuss about the different type of taper turning methods with sketches. [5+5]

- 4.a) Differentiate among shaping, planning and slotting machines.
- b) What is a jig-boring machine? Describe its construction and working in detail with a neat sketch. [5+5]

- OR
- 5.a) A C.I. plate measuring 300mm × 100mm × 40mm is to be rough shaped along its wider face. Calculate the machining time taking approach = 25mm, over travel = 25mm, cutting speed = 12m/min, return speed = 20m/min, allowance on either side of the plate width = 5mm and feed per cycle = 1mm. [5+5]
  - b) Explain in detail with neat sketches horizontal type of boring machines. [5+5]

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6.a) What is indexing? Explain some common methods of indexing in milling machines.

b) Calculate the grinding force in surface grinding operation using grinding wheel of 250mm diameter, rotating at 2500rpm. The work piece is of mild steel having width of 20mm, depth of cut = 0.05mm and feed velocity of table = 2mm/sec. Assume the no of grits/mm<sup>2</sup> = 3mm. Take value of specific energy for mild steel = 1.4J/mm<sup>2</sup>. [5+5]

OR

7.a) Sketch and explain the working of plain column and knee type milling machine.

b) What are the various factors to be considered in selection of grinding wheel? Discuss each in detail. [5+5]

8.a) Explain the use of sine bar for setting a component for a given angle.

b) Compare and contrast unilateral and bilateral tolerance system. [5+5]

OR

9. A hole and shaft system had the following dimensions:

60 H 8 / c 8

The multiplier of grade 8 is 25.

The fundamental deviation for 'C' shaft is - (9.5 + 0.8 D)

The diameter slip is 50 - 80.

Design the suitable 'GO' and 'NO-GO' gauges for shaft and hole. [10]

10.a) The heights of peak and valleys of 20 successive points on a surface are 35, 25, 40, 22, 37, 19, 41, 21, 42, 18, 42, 24, 44, 25, 40, 18, 40, 18, 39, 21 microns respectively, measured over a length of 20mm. Determine CLA and RMS values of roughness surface. [5+5]

b) Explain various alignment tests to be conducted on milling machine. [5+5]

OR

11.a) What is a drunken thread? Explain in detail.

b) Suggest and explain a method to check the root thickness of gear teeth. [5+5]