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GIET UNIVERSITY, GUNUPUR – 765022
M. Tech (Second Semester Examinations) – October' 2021
MPCMT2010 – METAL CUTTING – THEORY AND PRACTICE
(Manufacturing Technology)

Time: 2 hrs

Maximum: 50 Marks

(The figures in the right hand margin indicate marks)

PART – AQ.1. Answer **ALL** questions

(2 x 10 = 20)

- Define the orthogonal and oblique cutting.
- In an orthogonal machining operation, the chip thickness and the uncut thickness are equal to 0.45 mm. If the tool rake angle is 0° . Calculate the shear plane angle.
- What are the favourable factors for continuous chip formation?
- List the characteristics of cutting fluid.
- Discuss the significance of 18-4-1 in HSS tool material?
- Define machine ability of metal.
- Write the Taylor's tool life equation.
- Illustrate the four important characteristics of materials used for cutting tools?
- Estimate the tap drill size to cut an internal thread for bolt of outside diameter 10mm, pitch 1.5mm and depth of the thread 0.61 pitch?
- Define point angle of a drill.

PART – B

(6 x 5 = 30 Marks)

Answer **ANY FIVE** questions

Marks

- In an orthogonal cutting process, the following observations were made: Depth of cut = 0.25 mm; width of cut = 4 mm, chip thickness ratio = 0.45 cutting velocity = 40 m/ min cutting force parallel to the cutting vector = 1150 N cutting force component normal to cutting velocity vector = 140 N, rake angle = 18° . Determine resultant cutting force. Shear plane angle, friction angle and force component parallel to shear plane (6)
- Explain the working principle of lathe tool dynamometer (6)
- Draw the merchant circle and express the normal and shear forces, cutting forces and thrust force. (6)
- During machining of the component following data was observed. Machining constant 80, tool changing time 5min, regrinding time 3min, tool depreciation cost Rs. 1.2/grind, operating cost 25paise/min, labour cost 20paise/min, feed 0.25 mm/min, $n=0.25$, job length 500mm, diameter of job 60mm, idle time 4 min, Calculate Optimum cutting speed for min cost, Tool life for min cost, Cutting speed for max production, Tool life for max production, Total cost of each component (6)
- Elaborate tool life? Explain the parameters that control the tool life of a single point cutting tool. (6)
- Differentiate between (6)
 - up milling and down milling
 - surface grinding and cylindrical grinding
- Derive the expression for drilling torque and drilling power. (6)

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