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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belgaum)

Sixth Semester, B.E. - Industrial and Production Engineering

Semester End Examination; June/July - 2015

Tool Engineering Design

Time: 3 hrs

Max. Marks: 100

*Note: i) Answer any FIVE full questions, selecting at least TWO full questions from each part.
ii) Assume any missing data suitably.*

PART - A

- 1 a. What are the types of chips? Explain with the help of suitable sketches. 10
- b. Derive an expression for merchant's circle diagram. Clearly state the assumptions made. 10
- 2 a. Explain the properties of cutting tool material. 8
- b. Explain the following cutting tool materials indicating clearly the compositions: 12
 - (i) Ceramics
 - (ii) Carbide
 - (iii) Cubic Boron nitride
- 3 a. Design a rectangular cross section single point cutting tool for the following data and check for the rigidity. 10

Take Young's modulus $E = 2 \times 10^5 \text{ N/mm}^2$, $\sigma_b = 400 \text{ N/mm}^2$

Main cutting force = 2000 N

Length of over change = 60 mm,

- b. Sketch and explain the flat and circular form tool for zero rake and zero clearance angle. 10
- 4 a. Design a taper shank twist drill for drilling 15 mm diameter hole state your assumptions. 10
- b. Design a profile sharpened plain milling cutter for the arbor diameter of 30 mm. Take rake angle 30° and clearance angle 10° . Assume any missing data. 10

PART - B

- 5 a. M.S. Washers of 2 mm thick (Take 20 washers at a time) and 35 mm hole are to be enlarged to 38 mm by broaching. Take cut per tooth or rise per tooth as 0.08 mm. Design the broach and draw an illustrate sketch. 10
- b. Discuss in detail the procedure for designing tap to cut the ISO metric thread. Write the schematic sketch of the tap. 10
- 6 a. Explain with the help of a sketch 3-2-1 principles of location. 10
- b. Sketch and explain any two types of clamps used in fixture design. 10
7. Sketch and explain the following types of Jigs : 20
 - i) Plate Jig
 - ii) Leaf Jig
 - iii) Box Jig
 - iv) diameter Jig
- 8 a. Explain with a neat sketch a turning fixture. 10
- b. Explain with a neat sketch a milling fixture. 10