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## Third Semester B.E. Degree Examination, Dec.2019/Jan.2020 Metal Cutting and Forming

Time: 3 hrs.

Max. Marks: 100

*Note: Answer any FIVE full questions, choosing ONE full question from each module.*

### Module-1

- 1 a. Name and explain with example the different types of chips formed during metal cutting. (06 Marks)
- b. Draw Merchant's circle diagram and state the assumptions made in establishing the relationship among the various forces. (08 Marks)
- c. During an orthogonal cutting process the following observations were made-chip thickness = 0.62mm feed 0.2 mm rake angle 15°. Calculate the chip reduction coefficient and shear angle. (06 Marks)

OR

- 2 a. Differentiate between Turret lathe and Capstan lathe. (06 Marks)
- b. Draw the tool layout for producing a hexagonal headed bolt on a capstan lathe from a hexagonal bar stock. Assume the dimensions. (08 Marks)
- c. Write the functions of following lathe accessories :  
(i) Live centre      (ii) Dead centre      (iii) Steady rest      (iv) Follower rest  
(v) Dogs and face plates. (06 Marks)

### Module-2

- 3 a. With sketch write the comparison between up milling and down milling. (06 Marks)
- b. Sketch and explain radial drilling machine highlighting its advantages and disadvantages. (08 Marks)
- c. What is indexing? Name the different methods of indexing and explain compound indexing. (06 Marks)

OR

- 4 a. Differentiate Shaper and Planer? (06 Marks)
- b. With sketch explain the external centreless grinding highlighting the feed mechanism. (08 Marks)
- c. How the shapers are classified? How a vertical shaper is different from slotter. (06 Marks)

### Module-3

- 5 a. Write a note on functions and types of cutting fluids used in metal cutting. (06 Marks)
- b. Explain the various mechanisms responsible for different forms of tool wear. (08 Marks)
- c. A cast iron plate of dimensions 450×150×60 mm, is to be rough shaped along its wider face. Calculate the machining time taking cutting speed = 10 mpm, return speed = 15 mpm, approach length = 30mm, over travel length = 30 mm, allowance on either side of the plate width = 6mm and feed per cycle = 15mm. (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.



OR

- 6 a. Which are the different forms of wear on the cutting edge of a tool? With appropriate sketch explain. (06 Marks)
- b. Explain the critical cutting parameters which effect the tool life. (08 Marks)
- c. The tool life for a HSS tool is expressed by the relation  $VT^{1/7} = C_1$  and for Tungsten-Carbide  $VT^{1/5} = C_2$ . If the tool life for cutting speed of 24 mpm is 128 min, compare the life of the two tools at a speed of 30 mpm. (06 Marks)

**Module-4**

- 7 a. List the differences between cold working and hot working. (06 Marks)
- b. What is forging? Explain the working of board hammer with sketch. (08 Marks)
- c. With sketch explain : (i) Two high rolling mill (ii) Planetary rolling mill. (06 Marks)

OR

- 8 a. How the extrusion process is classified? Write a note on the difference between direct and indirect extrusion. (06 Marks)
- b. With neat sketch explain the wire drawing process. (08 Marks)
- c. Explain the defects in extruded products. (06 Marks)

**Module-5**

- 9 a. With a neat sketch explain V-bending and edge bending operations. (06 Marks)
- b. What do you mean by dies? Write brief note on (i) Progressive dies (ii) Combination dies. (08 Marks)
- c. With neat sketch explain shearing of sheet metal. (06 Marks)

OR

- 10 a. What is stripper? With neat sketch explain fixed plate stripper. (06 Marks)
- b. With a neat labeled sketch explain the parts of open back inclinable press. (08 Marks)
- c. Calculate the bending force for the 90° bend part from the steel sheet with air bending. The bend length is 30 cm, the material thickness is 2.5 mm and beam length is 25mm. The tensile strength of the material is 32 kN/cm<sup>2</sup>. Die opening factor = 1.33. (06 Marks)

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