CBCS SCHEME

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17ME35B

Third Semester B.E. Degree Examination, June/July 2019
Machine Tools and Operations

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Write the classification of machine tools. **(05 Marks)**

b. Define: i) Drilling ii) Milling iii) Turning iv) Grinding v) Broaching. **(05 Marks)**

c. Explain the constructional features of planning machine with a neat sketch. **(10 Marks)**

OR

2 a. List and classify different types of drilling machines. **(05 Marks)**

b. With a suitable sketch, explain the size and specifications of engine lathe. **(05 Marks)**

c. With a neat sketch, explain constructional features of centreless grinding machine. **(10 Marks)**

Module-2

3 a. Define primary and secondary motions in machining. **(04 Marks)**

b. With sketches, differentiate between up milling and down milling operations. **(06 Marks)**

c. Define the machining parameters: i) Cutting-speed ii) Feed iii) Depth of cut iv) Machining time v) Metal removal rate with respect to shaping operation. **(10 Marks)**

OR

4 a. With sketches, differentiate between shaping and planning operations. **(07 Marks)**

b. With suitable sketches, explain cylindrical traverse grinding and plunge cylindrical grinding. **(06 Marks)**

c. What is slab milling, and explain the determination of machining time for slab milling operation. **(07 Marks)**

Module-3

5 a. List various cutting tool materials in the increasing order of their hardness. **(05 Marks)**

b Mention the effects of adding following alloying elements in High Speed Steel (H.S.S) tool material (Also mention approximate percentage of each element.
i) Tungsten ii) Molybdenum iii) Vanadium iv) Cobalt. **(07 Marks)**

c. Show the different cutting angles of a single point cutting tool, with a neat sketch. **(08 Marks)**

OR

6 a. List the desirable properties of cutting fluids, recommend suitable cutting fluid to machine i) Aluminium ii) Copper and copper alloys iii) Cast iron. **(08 Marks)**

b. Define: i) Roughness ii) Waviness iii) Lay iv) Surface flaws with respect to surface finish. **(04 Marks)**

c. A work piece of diameter 38mm and length 400mm was turned on a Lathe using a suitable cutting tool. Determine the machining time to reduce the work piece to 36.5mm diameter in one pass with cutting speed of 30mpm and feed 0.7mm / revelation. **(OR Markel**

Module-4

7 a. With a suitable sketch, describe orthogonal and oblique cutting operations. (10 **Marks)**

b. Derive the condition 24) + p - a = 7t/2 for orthogonal cutting. Explain its significance with usual notations. **(10 Marks)**

OR

8 a. What types of chips are generated while machining i) Cast iron ii) Mild steel iii) Copper. Justify your answer. **(06 Marks)**

b. Explain the relationship between cutting velocity and chip flow velocity and cutting velocity and sheer velocity and prove the same. **(06 Marks)**

c. In an experiment a pipe is turned on end in orthogonal cutting condition with a tool of 20° rake angle. A chip length of 85mm is obtained from an uncut chip length of 202mm while cutting with a depth of cut of 0.5mm. Determine the shear plane angle and chip thickness. **(08 Marks)**

Module-5

9 a. Define tool wear. Explain the following terms:

i) Diffusion wear mechanism

ii) Fatigue wear mechanism. **(06 Marks)**

b. Explain the factors affecting the machinability of a material. **(06 Marks)**

c. If n = 0.4 and c = 400 in the Taylor's tool life equation for tool wear. What is the percentage increase in tool life if the cutting speed is reduced by 20%? **(08 Marks)**

OR

10 a. Explain graphically the variation of components of machining cost with cutting speed. (10 **Marks)**

b. The following Taylor tool life equation for carbide tool steel work piece pair was obtained experimentally $VT^{(-5} = 650$. Where 'V' is in m/min and 'T' in min. A batch of 1000 steel parts each 100mm in diameter and 250mm in length is to be rough turned using a feed of 0.2mm/revol^{n}. If the cost per cutting edge of the throw away carbide insert is Rs.50, time required to reset the cutting edge is I min and the total machine rate is Rs.300/hr, calculate: i) Optimum cutting speed for minimum cost ii) Corresponding tool life. **(10 Marks)**