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**Question Paper Code : X10896**

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2020  
Seventh Semester

Aeronautical Engineering

OPR 751 – BASICS IN MANUFACTURING AND METAL CUTTING PROCESS  
(Common to Aerospace Engineering/Robotics and Automation/Materials Science  
and Engineering)  
(Regulations 2017)

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions

PART – A

(10×2=20 Marks)

1. What is the use of follower rest and steady rest ?
2. How can you specify a lathe ?
3. What is need of quick return motion mechanism of in shaper ?
4. What is the use of Saddle in shaper ?
5. What are the function of flutes on a twist drill bit ?
6. Define the following terms cutting speed and feed used in drilling operation.
7. Using the Taylor equation for tool life and letting  $n = 0.5$  and  $C = 120$ , calculate the percentage increase in tool life when the cutting speed is reduced by 50%.
8. Name the factors that contribute to the formation of discontinuous chips.
9. What is a cermet ?
10. List the major functions of cutting fluids.

PART – B

(5×13=65 Marks)

11. a) Using neat sketches, describe the various operations that can be carried on lathe machines.

(OR)

- b) Name different methods of taper turning. Describe these methods using neat sketches.



12. a) Explain the various operations that can be carried on shaping machines.

(OR)

b) Explain principal parts of a shaper by neat sketch.

13. a) Explain the working principle of a drilling machine.

(OR)

b) Explain the devices commonly used for holding the work on a drilling machine.

14. a) Assume that, in orthogonal cutting, the rake angle,  $\alpha$  is  $20^\circ$  and the friction angle,  $\beta$  is  $35^\circ$  at the chip-tool interface. Determine the percentage change in chip thickness when the friction angle is  $50^\circ$ .

(OR)

b) Explain why the cutting force increases with the depth of cut and decreasing rake angle.

15. a) What are the major properties required of cutting-tool materials ? Why ?

(OR)

b) List the methods by which cutting fluids are typically applied in machining operations.

PART – C

(1×15=15 Marks)

16. a) Using trigonometric relationships, derive an expression for the ratio of shear energy to frictional energy in orthogonal cutting, in terms of angles  $\alpha$ ,  $\beta$  and  $\gamma$  only.

(OR)

b) Tool life is increased greatly when an effective means of cooling and lubrication is implemented. Design methods of delivering this fluid to the cutting zone and discuss the advantages and limitations of your design.

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