

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)**

CLASS: BE
BRANCH: PRODUCTION/MECHANICAL

SEMESTER: IV/ADD
SESSION : SP/2019

SUBJECT : PE4001 MANUFACTURING PROCESS-I

TIME: 1.5 HOURS

FULL MARKS: 25

INSTRUCTIONS:

1. The total marks of the questions are 30.
 2. Candidates may attempt for all 30 marks.
 3. In those cases where the marks obtained exceed 25 marks, the excess will be ignored.
 4. Before attempting the question paper, be sure that you have got the correct question paper.
 5. The missing data, if any, may be assumed suitably.
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- Q1 (a) Explain the advantages and limitations of positive rake angle. [2]
(b) What are the various elements indicated while specifying tool signature? With the help of diagram show the various elements on a tool bit tool having signature of 15,15, 10, 10, 15, 10. 0.8mm in ASA system. [3]
- Q2 (a) With the help of diagram derive the formula for determining shear plane angle in terms of rake angle. [2]
(b) The cutting force and thrust force have been measured in an orthogonal cutting operation to be 300 N and 291 N, respectively. The rake angle = 10° , width of cut = 0.200 mm, chip thickness before the cut = 0.015 mm, and chip thickness ratio = 0.4. Determine (a) the shear strength of the work material and (b) the coefficient of friction in the operation. [3]
- Q3 (a) Define tool life. Explain how tool life curves are established. [2]
(b) What are the various grades of HSS? Explain the effects of major alloying elements on HSS cutting tools. [3]
- Q4 (a) What is extreme pressure lubrication? Why lubricants lose their effectiveness at high speeds? [2]
(b) Tool life tests on a lathe have resulted in the following data: (1) at a cutting speed of 375 ft/min, the tool life was 5.5 min; (2) at a cutting speed of 275 ft/min, the tool life was 53 min. (a) Determine the parameters n and C in the Taylor tool life equation. (b) Using your equation, compute the tool life that corresponds to a cutting speed of 300 ft/min. (c) Compute the cutting speed that corresponds to a tool life T = 10 min. [3]
- Q5 (a) What is the main function of a lathe? List various types of lathes. [2]
(b) What is a mandrel? Why they are used in lathes. Describe different types of mandrels. [3]
- Q6 Define taper. How is the amount of taper expressed? Name different methods of taper turning done on a center lathe drawing simple sketches? [5]

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