BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI

(MID SEMESTER EXAMINATION)

CLASS: BE **SEMESTER : IV**
BRANCH: PROD./MECH. **SESSION : SP/17**

SUBJECT: PE4001-MANUFACTURING PROCESSES I

TIME: 1.5 HOURS **FULL MARKS: 25**

INSTRUCTIONS:

1. The total value of the questions are 30 marks.
2. Candidates may attempt for all 30 marks.
3. In those cases where the marks obtain 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.
6. Nothing should be written on front or back of the question paper except tick marking.

Q1. (a) Compare the reasons and effects of using positive and negative rake angles. [1]
(b) A right hand turning tool is designated as 8-10-11-12-14-13-2. Draw different views to show all the angles and nose radius. [4]

Q2. A carbon steel bar with 7.64 in diameter has a tensile strength of 65,000 lb/in^2 and a shear strength of 45,000 lb/in^2. The diameter is reduced using a turning operation at a cutting speed of 400 ft/min. The feed is 0.011 in/rev and the depth of cut is 0.120 in. The rake angle on the tool in the direction of chip flow is 13^0. The cutting conditions result in a chip ratio of 0.52. Using the orthogonal model as an approximation of turning, determine (a) the shear plane angle, (b) shear force, (c) cutting force and feed force, and (d) coefficient of friction between the tool and chip. [5]

Q3. (a) Why are ceramic cutting tools generally designed with negative rake angles? [1]
(b) What are the common mechanisms causing wear on cutting tools? Explain in brief. [4]

Q4. A machinability rating is to be determined for a new work material. For the base material (B1112), test data resulted in a Taylor equation with parameters n = 0.29 and C = 490. For the new material, the Taylor parameters were n = 0.23 and C = 430. Units in both cases are: speed in m/min and tool life in min. These results were obtained using cemented carbide tooling. (a) Compute a machinability rating for the new material using cutting speed for a 30-min tool life as the basis of comparison. (b) If the machinability criterion were tool life for a cutting speed of 150 m/min, what is the machinability rating for the new material? [5]

Q5. (a) Name the various ways in which a work can be held in a lathe. [2]
(b) Differentiate between center lathe and turret lathe. [3]

Q6. (a) With the help of block diagram discuss the following components of center lathe: Headstock, Tailstock, Carriage & its component. [5]

*******02.03.17*****M**