BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: BE **SEMESTER : IV**
BRANCH: PROD./MECH. **SESSION : SP/18**

SUBJECT: PE4001 MANUFACTURING PROCESS-I

TIME: 3 HOURS **FULL MARKS: 60**

INSTRUCTIONS:
1. The question paper contains 7 questions each of 12 marks and total 84 marks.
2. Candidates may attempt any 5 questions maximum of 60 marks.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

Q.1(a)	What is an orthogonal cutting operation? Why is the orthogonal cutting model useful in the analysis of metal machining?	[2]
Q.1(b)	How many types of chips are formed in metal cutting? What factors are responsible for formation of these different types of chips?	[4]
Q.1(c)	In a turning operation, spindle speed is set to provide a cutting speed of 1.8 m/s. The depth of cut and feed of cut are 0.30 mm and 2.6 mm, respectively. The tool rake angle is 8°. After the cut, the deformed chip thickness is measured to be 0.49 mm. Determine (a) shear plane angle, (b) shear strain, and (c) material removal rate. Use the orthogonal cutting model as an approximation of the turning process.	[6]
Q.2(a)	What are the important functions of a cutting fluid? Why the cutting fluid acts only as a coolant at higher cutting speed?	[2]
Q.2(b)	What is tool wear? What are the various types of tool wear? Explain the reasons of tool wear.	[4]
Q.2(c)	Tool life tests in turning yield the following data: (1) when cutting speed is 100 m/min, tool life is 10 min; (2) when cutting speed is 75 m/min, tool life is 30 min. (a) Determine the n and C values in the Taylor tool life equation. Based on your equation, compute (b) the tool life for a speed of 110 m/min, and (c) the speed corresponding to a tool life of 15 min.	[6]
Q.3(a)	List various parts of a lathe machine.	[2]
Q.3(b)	Differentiate between Capstan lath and Turret Lathe.	[4]
Q.3(c)	What are advantages and limitations of shaper? With the help of neat diagram explain the working principal of quick return mechanism of a shaper machine.	[6]
Q.4(a)	Write the classification of milling machines.	[2]
Q.4(b)	What are various drilling operations? Explain with the help of neat diagram.	[4]
Q.4(c)	Briefly explain various milling cutters.	[6]
Q.5(a)	'Grinding is micro-milling' – Justify the statement.	[2]
Q.5(b)	Discuss the factors which effects the selection of grinding wheels.	[4]
Q.5(c)	Explain the principle of working of external and internal center-less grinding process.	[6]
Q.6(a)	What are the various methods for manufacturing gears?	[4]
Q.6(b)	Explain compound indexing. Using compound indexing method index for cutting a 141 teeth gear.	[8]
Q.7(a)	Why are the nontraditional material removal processes important?	[2]
Q.7(b)	How does the ultrasonic machining process work?	[4]
Q.7(c)	With the help of neat diagram explain the principal of operation of Water Jet Machining Process. Discuss its applications, advantages and limitations.	[6]

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