Ref. No. : Ex/Prod/T/222/2018

B. PROD.ENGG. 2-ND YEAR 2-ND SEM. EXAM.-2018

TECHNOLOGY OF MACHINING SYSTEMS

Time : 3 Hrs. **Full Marks :100**

Part –I (50 marks)

Use Separate Answer scripts for each Part.

Answer any five questions

1. A cylindrical bar is to be turned. The maxm. allowable feed is 0.2 mm/rev. & at this feed rate Taylor's tool life eqn. for a tool-work combination is found to be:

$$v.T^{0.25}=75$$

where v is the cutting speed in m./min. & T is the corresponding tool-life in mins. The labour costs & overheads is 75 p./min. & the total cost involved in each re-grinding of the tool is Rs. 12.50/-. On the avg. it takes abt. 2 mins. to change the tool. Estimate the cutting speed that will lead to the minimum cost. 10

2. a) In grinding, the cutting operation is done by grits. What are the most important features that characterizes the cutting operation of grits? 5
b) What are the working motions of superfinishing. 3
c) For grinding of ductile matls., what structure of grinding wheel is preferred & why? 2

3. The expression for optimum cutting speed for minm. cost (for a given value of feed) in a Turning Operation is:

$$V_{opt} = [n.k.\lambda_1/\{(1-n).f^{1/m}.(\lambda_1.t_{ct}+\lambda_4)\}]^n$$

Explain each term of this eqn. 10

4. a) Discuss the following as cutting tool matls.:
HSS, Cast non-ferrous alloys. 3+3
b) What is "glazing" & "dressing" of a grinding wheel? 2+2

5. a) What are the desirable properties of any cutting tool matl.? 5
b) What are the advantages of honing? 4
c) Why don't the coatings in coated tools break? 1

6. a) Name the 2 principal methods of coating with the approx. temp. at which these processes are carried out. 4
b) What are the typical constituents of coatings of hard metals? 4
c) What is "loading" of the Grinding Wheel? 2

[Turn over

7. a) What are the imp. technological parameters that affect MRR & surface roughness (R) of Lapping process? 4
b) Write shortly on carbides as cutting tool matls. 4
c) "In Grinding wheels the bond matls. commonly used are vitrified clay, resinoid matls. etc." What is vitrified clay? 1
d) For grinding of hard & brittle matls., what structure of grinding wheel is preferred? 1

8. a) What are the disadvantages of coating? 3
b) What are the imp. parameters that affect the honing process? 3
c) What are the features by which lapping is characterized? 3
d) How much is the solubility of the typical constituents of coatings (of hard metals) in iron? 1

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B.E. PRODUCTION ENGINEERING SECOND YEAR SECOND SEMESTER - 2018

SUBJECT : TECHNOLOGY OF MACHINING SYSTEMS

Time : Three hours **Full Marks 100**

Use a separate Answer-Script for each part
(50 marks for each part)

No. of questions	PART- II Answer any five questions	Marks
9.	What is chip reduction co-efficient? Show cross section of uncut chip and indicate uncut chip thickness. Establish the relation between uncut chip thickness and feed using necessary figure. How can chip reduction co-efficient be determined in a turning operation using a lathe?	1+7+3
10.	Establish a relation between the orthogonal rake angle (γ_0), the shear angle (β), and the chip reduction co-efficient (ξ), of a single point cutting tool in metal cutting operation. Write the assumptions made, if any, for developing the relation.	9+1
11.	Show orientation of face and flank surfaces of a single point cutting tool in ORS system and Machine Reference system (ASA).	5+5
12.	Show all the forces acting on chip with the help of a neat sketch (F.B.D.) of a chip segment being in equilibrium under the action of several forces). Also show forces on tool exerted by chip.	6+4
13.	During cylindrical turning of a job with a 0-4-4-5-8-70-1 mm ORS shaped tool , the following observations have been made using a tool force dynamometer: Cutting force (P_z) = 150 kgf Radial component of thrust force (P_y) = 80 kgf Feed, (f) = 0.1 mm/rev. Depth of cut (t) =1 mm Chip thickness (a_2) = 0.2 mm Calculate (i) the friction force (F), at the chip-tool interface (ii) the shear force (P_s), at the shear plane (Deduce all expressions/relations to solve the problem)	10
14.	Show tool wear on face and flank surfaces with neat sketches. Show the growth of flank wear with respect to time of machining. Explain how tool life can be estimated from the tool wear information (indicate Tool Life on figure). Also show the growth of flank wear with respect to time of machining for various cutting speeds and describe how Taylor's Tool Life equation is derived from the flank wear growth information.	2+2+2+4
15.	Show how incorrect setting of tool with respect to workpiece can change the effective rake and clearance angle in a turning operation in a lathe. Also show how feed motion changes the effective rake and clearance angle in a parting operation in a lathe. Use suitable figures to illustrate.	6+4
16.	Discuss about proper choice of cutting speed, feed and depth of cut in machining. Using suitable figures, show the effect of feed on surface finish of a job machined in a Lathe OR Shaper	6+4