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Ex/Prod/T/311/2017(OLD)(S)

B. Prod. E. 3-rd Yr., 1-st Sem. Supple. Exam, 2017(OLD)

Tech. of Machining Sys.

T:3 Hrs. F M -100

Use separate Answer-scripts for each part.

Part – I (50 marks)

Answer any **5** Q.s

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 minm. cost 10

2. a) What are the working motions of superfinishing? 3
   b) Name the 2 principal methods of coating with the approx. temp. at which these processes are carried out. 4
   c) What are the imp. parameters that affect the honing process? 3

3. a) What are the imp. technological parameters that affect MRR & surface roughness (R) of Lapping process? 4
   b) Discuss the following as cutting tool matls.:
   HSS, Cast non-ferrous alloys. 3+3

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

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

   Explain each term of this eqn. 10

5. a) In grinding, the cutting operation is done by grits. What are the most imp. features that characterizes the cutting operation of grits? 5
   b) What are the typical constituents of coatings of hard metals? 4
   c) How much is the solubility of the typical constituents of coatings (of hard metals) in iron? 1

6. a) What are the disadvantages of coating? 3

b) What is "loading" of the Grinding Wheel? 2

c) Write shortly on carbides as cutting tool matls. 4

d) "In Grinding wheels the bond matls. commonly used are vitrified clay, resinoid matls. etc." What is vitrified clay? 1

7. a) What are the desirable properties of any cutting tool matl.? 5

b) What are the features by which lapping is characterized? 3

c) For grinding of ductile matls., what structure of grinding wheel is preferred & why? 2

8. a) What is "glazing" & "dressing" of a grinding wheel? 2+2

b) What are the advantages of honing? 4

c) For grinding of hard & brittle matls., what structure of grinding wheel is preferred? 1

d) Why don't the coatings break? 1

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B. PRODUCTION 3RD YR. 1ST SEM. SUPPLE. EXAM.- 2017 (OLD)

SUBJECT : TECHNOLOGY OF MACHINING SYSTEMS **Time : Three hours** **Full Marks 100**

PART- II
Answer any five questions

No. of questions	Use a separate Answer-Script for each part (50 marks for each part)	Marks
9.	Discuss why proper choice of cutting speed and feed is must for optimum cutting conditions. Also discuss about the proper choice of depth of cut. Using suitable figures, show the effect of feed on surface finish of a job machined in a i) Lathe, ii) Shaper.	4+1+3+2
10.	Show orientation of face and flank surfaces of a single point cutting tool in Machine Reference system (ASA) and ORS system	10
11.	Establish a relation between the shear angle (β), orthogonal rake angle (γ_0), 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
12.	What is chip reduction co-efficient? What is the significance of chip reduction co-efficient? How can it be determined in a turning operation using a lathe? Show necessary figures and calculations.	2+2+6
13.	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).	10
14.	During cylindrical turning of a job with a 0-4-5-4-8-74-1 mm ORS shaped tool , the following observations have been made using a tool force dynamometer: cutting force (P_z) = 165 kgf radial component of thrust force (P_y) =40 kgf feed, (f) = 0.1 mm/rev. depth of cut (t) =1 mm chip thickness (a_2) = 0.2 mm Calculate (i) the shear force (P_s), at the shear plane (ii) the friction force (F), at the chip-tool interface (Deduce all expressions/relations to solve the problem)	10
15.	Show tool wear on face and flank surfaces with neat sketches. Show the growth of flank wear with respect to time of machining for various cutting speeds. Explain how tool life can be estimated from the tool wear information. Also describe how Taylor's Tool Life equation is derived from the flank wear growth information.	3+3+2+2