B.E. PRODUCTION ENGINEERING
SECOND YEAR
SECOND SEMESTER EXAM 2019

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) Why don't the coatings break? 1
b) What is "glazing" & "dressing" of a grinding wheel? 2+2
c) In grinding, the cutting operation is done by grits. What are the most important features that characterizes the cutting operation of grits? 5

2. a) What are the typical constituents of coatings of hard metals? 4
b) What are the important parameters that affect the honing process? 3
c) What are the working motions of superfinishing. 3

3. A cylindrical bar is to be turned. The maximum 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 minutes. 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 about 2 minutes to change the tool. Estimate the cutting speed that will lead to the minimum cost. 10

4. a) Name the 2 principal methods of coating with the approximate temperature at which these processes are carried out. 4
b) Discuss the following as cutting tool materials.:
HSS, Cast non-ferrous alloys. 3+3

5. a) How much is the solubility of the typical constituents of coatings (of hard metals) in iron? 1
b) For grinding of ductile materials, what structure of grinding wheel is preferred & why? 2
c) Write shortly on carbides as cutting tool matls. 4
d) What are the disadvantages of coating? 3

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

[Turn over

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

Explain each term of this eqn. 10

7. a) "In Grinding wheels the bond materials commonly used are vitrified clay, resinoid materials etc." What is vitrified clay? 1
b) What are the desirable properties of any cutting tool material? 5
c) What are the features by which lapping is characterized? 3
d) For grinding of hard & brittle materials, what structure of grinding wheel is preferred? 1

8. a) What are the important technological parameters that affect MRR & surface roughness (R) of Lapping process? 4
b) What are the advantages of honing? 4
c) What is "loading" of the Grinding Wheel? 2

Ref. No. Ex/Prod/T/222/2019

B.E. PRODUCTION ENGINEERING SECOND YEAR SECOND SEMESTER - 2019

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
1.	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
2.	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.	10
3.	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
4.	During cylindrical turning of a job with a 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 Principal cutting edge angle(ϕ)=70 degree, Rake angle(γ)=4 degree. 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
5.	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
6.	Show how incorrect setting of tool with respect to work piece can change the effective rake and clearance angle in a turning operation in a lathe. Use suitable figures to illustrate.	10
7.	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