Ref. No.: Ex/PROD/PC/B/T/226/2024

B.E. PRODUCTION ENGINEERING SECOND YEAR SECOND SEMESTER EXAM - 2024

Subject: TECHNOLOGY OF MACHINING SYSTEMS
Part: I

Time: 3 hours **Full Marks: 100**

(Use Separate Answer Scripts for Each Group)

Answers any five questions

1. (a) Draw the schematic of all geared headstock mechanism and explain elaborately.
   (b) Draw and explain the different type of tool used in lathe machine tool.
   (5+5=10)
2. Write down the short note: (a) Tumbler gear reversing mechanism (b) Quick change gear box.
   (5+5=10)
3. (a) Draw the schematic views of conventional up milling and down milling.

   (b) Determine Tc for plain milling a rectangular surface of length 100 mm and width 50 mm by a helical fluted plain HSS milling cutter of diameter 60 mm, length 75 mm and 6 teeth. Assume A = O = 5 mm, Vc = 40 m/min and s_o = 0.1.mm/tooth. **(4+6=10)**

4. (a) Write down the given specific term for grinding wheel specification:
   49- A-70-k-7-V-24
   (b) Elaborately explain different types of grinding operations using suitable diagram.
   (4+6=10)
5. Draw the different view of the solid single point cutting tool for turning operation based on ORS system and define the tool nomenclature from the defined system. **10**

6. (a) Write down a short note about (i) Honing (ii) Lapping.
   (b) When turning a cylindrical work piece, two different tools are used. In one tool, no nose radius is provided, the side cutting and end cutting edge angles being 30°and 7°, respectively. In the other tool, a nose radius of 0.7 mm is provided. The feed used in both the cases is 0.125 mm. Find out the maximum height of unevenness in the generated surface. **(6+4=10=10)**

[Turn over

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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.	Show cross section of uncut chip and indicate uncut chip thickness on that figure. Establish the relation between uncut chip thickness (a1) and feed (f) using necessary figure.	7+3
2.	Show how shear angle (β) can be determined from the uncut chip thickness (a1), actual chip thickness (a2) and orthogonal rake angle (γ_0) 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.	i) Show tool wear on face and flank surfaces with neat sketches. ii) Show the growth of flank wear with respect to time of machining. iii) Explain how tool life can be estimated from the tool wear information (indicate Tool Life on figure). iv) 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
5.	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,	8+2
6.	i) Show cutting velocity & direction of feed motion in cylindrical turning, facing, shaping & drilling. ii) Show rake angle & clearance angle with respect to cutting velocity vector, tool & job using a figure.	8+2
7.	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) = 130 kgf, Radial component of thrust force (P_y) = 70 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