Ref. No.: Ex/PROD/PC/B/T/226/2025

B.E. PRODUCTION ENGINEERING SECOND YEAR SECOND SEMESTER EXAM- 2025

Subject: TECHNOLOGY OF MACHINING SYSTEMS

Part: I

Time: 3 hours **Marks:50** **Full Marks: 100**

(Use Separate Answer Scripts for Each Group)

Answer any five questions

1. (a) Draw the schematic ofback gear arrangement mechanism and explain it elaborately.
   (b) Draw and explain the different types of tools used in lathe machine tools. **(5+5=10)**
2. (a) What is up milling and down milling?
   (b) Estimate the machining time that will be required to finish a vertical flat surface of length 100 mm and depth 20 mm by an 8-tooth HSS end mill cutter of 32 mm diameter and 60 mm length in a milling machine. Assume, V_C = 30 m/min, So = 0.12 mm/tooth.
   (4+6=10)
3. (a) Write down the given specific term for grinding wheel specification:
   R D 120 N 100 M 4
   (b) Elaborately explain different types of grinding operations using a suitable diagram.
   (4+6=10)
4. (a)Write down the short note: (a) All geared head box, (b)Quick change gearbox.
   (b)Write down the note (i) Truing and dressing of the grinding wheel (ii) super finishing.
   (5+5=10)
5. (a) Write down a short note about (i) Honing (ii) Lapping.
   (b) When turning a cylindrical workpiece, 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 cases is 0.125 mm. Find out the maximum height of unevenness in the generated surface.
   (6+4=10)
6. (a) Determine the time that will be required to drill a blind hole of diameter 25 mm and depth 40 mm in a mild steel solid block by an HSS drill of 1180 cone angle. Assume suitable values of V_C and So.
   (b) Write down the various applications of the shaping machine using a suitable diagram.
   (5+5=10)

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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. Also show forces on tool exerted by chip.	6+4
4.	i) How does higher cutting speed shorten tool life? ii) Show the growth of flank wear with respect to time of machining & indicate Tool Life. iii) Explain how tool life can be estimated from the tool wear information.. 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 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) = 1000 N, Radial component of thrust force (P_y) = 600 N 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