AHMEDABAD UNIVERSITY
School of Engineering and Applied Science
2025-2026 Monsoon

MEC208 Materials and Manufacturing Processes-II
End-term Examination
Thursday 04 December 2025. 14:00 – 16:00

Name:	Roll no.	A U 2							Marks /40

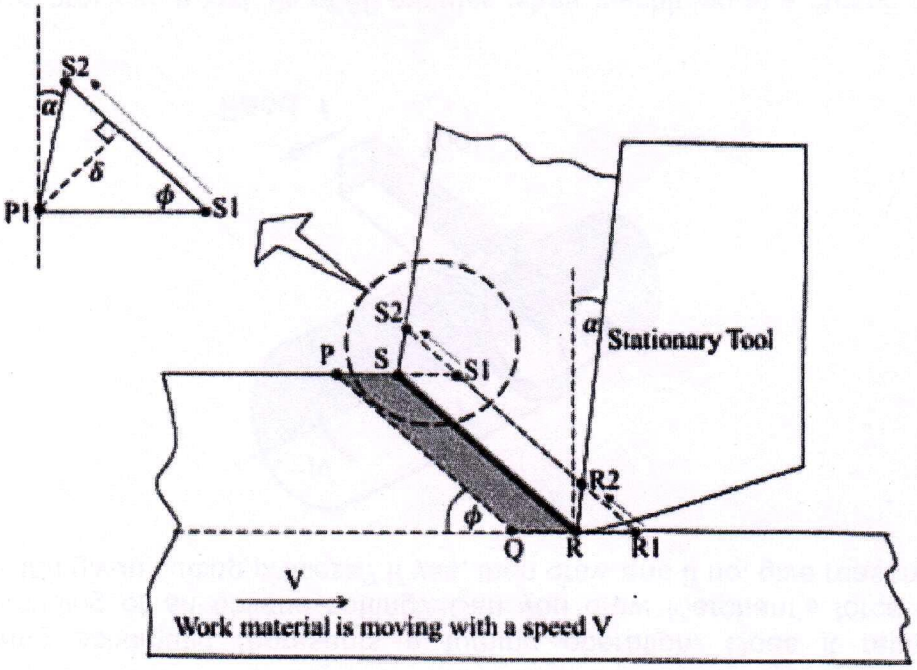
Instructions: *Write your answers in the answer book and then submit it. Answer all questions. Figures to the right indicate marks for each question. All acronyms and symbols carry their usual meaning. Assume suitable data wherever necessary and specify it clearly in your answers. The use of electronic gadgets is strictly prohibited; the use of a non-programmable scientific calculator is allowed for calculation only.*

1. Match the correct option(s) in the following:- *(4)*

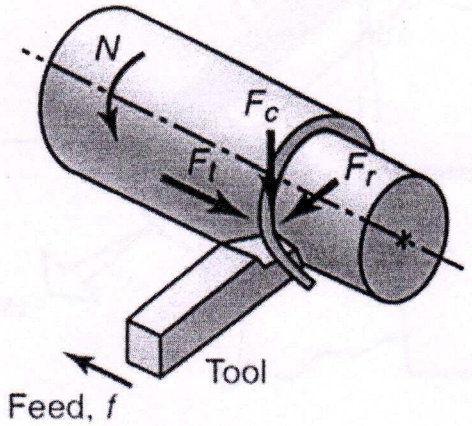
(a) Process that uses a tapered horn to amplify and focus the mechanical energy for machining	(i)	Lithography
(b) Process that involves ablation	(ii)	Ultrasonic machining
(c) Process that involves melting in metallic workpiece	(iii)	Electric discharge machining
(d) Process that uses UV-light and require clean room	(iv)	Laser beam machining

2. In a turning process using orthogonal tool geometry, a chip length of 100 mm is obtained for an uncut chip length of 250 mm. The cutting conditions are cutting speed = 30 m/min, rake angle = 20°. Find the shear plane angle (in degrees). *(5)*

3. In an ideal orthogonal cutting experiment (see figure), the cutting speed V is $1\ m/s$, the rake angle of the tool $\alpha = 5°$, and the shear angle, ϕ, is known to be $45°$. Applying the ideal orthogonal cutting model, consider two shear planes PQ and RS close to each other. As they approach the thin shear zone (shown as a thick line in the figure), plane RS gets sheared with respect to PQ (point $R1$ shears to $R2$, and $S1$ shears to $S2$). Assuming that the perpendicular distance between PQ and RS is $\delta = 25\ \mu m$, what is the value of shear strain rate (in s^{-1}) that the material undergoes at the shear zone? *(6)*



4. The following schematic represents a turning operation. Does it represent orthogonal cutting or an oblique cutting? Can you draw Merchant's force circle diagram for the given cutting process? If yes, then draw and if no, give reasons. *(5)*



5. A cutting tool provides a tool life of 60 minutes when machining at a cutting speed of 60 m/min. When the same tool is used for machining the same material, it provides a tool life of 10 minutes for a cutting speed of 100 m/min. If the cutting speed is changed to 80 m/min for the same tool and work material combination, find the tool life computed using Taylor's tool life model. *(4)*
6. Match the forming processes (Drawing, Deep drawing, Rolling, Extrusion) with their common application products (Rails, Cables, Window frames, Cookware) *(4)*
7. Friction plays an important role in enabling rolling. For rolling to occur, $\mu \geq tan\alpha$. Explain this with a clear schematic of flat plate rolling with straight cylindrical rolls. *(4)*
8. Draw the typical variation in pressure along the contact length in the flat rolling process. Mark and explain the peak pressure and neutral point. *(4)*
9. List the assumptions to determine the rolling pressure in the flat plate rolling process. *(4)*