Manufacturing Processes Important Questions PDF

The most important Manufacturing Processes topics are casting (patterns, allowances, gating and defects), metal forming (rolling, forging, extrusion, drawing), welding processes and defects, metal cutting with Merchant's circle and Taylor's tool life equation, and non-traditional machining such as EDM, ECM and USM. Learn neat labelled sketches for each process and practise short machining numericals.

Key takeaways

- These are practice questions based on common B.Tech syllabus topics. They are not verified past papers.
- Check your own university syllabus and official question papers before revising.
- Process sketches carry many marks in this subject. Practise drawing each one in under three minutes.
- Machining numericals (cutting speed, machining time, Taylor's equation, shear angle) are short and reliable marks.
- Learn defects with their causes and remedies in a table format.

Before you start: about these questions

Universities name this subject Manufacturing Processes, Manufacturing Technology or Production Technology, and some split it across two semesters. The five units below follow a common Indian B.Tech pattern. These are **practice questions based on common syllabus topics, not verified past papers**. Check your own syllabus and official papers. AKTU students can use the official AKTU old question paper page, and the Uncodemy previous year question papers hub links official sources for other universities.

Use the scientific calculator for Taylor's equation powers and trigonometry in Merchant's circle problems.

Unit 1: Casting

Definitions and short questions

- What is a pattern? List pattern materials and types of patterns.
- Explain pattern allowances: shrinkage, machining, draft, distortion and shake.
- What are the properties of good moulding sand?
- Define riser, sprue, runner and gate. What is the function of a core?

- List five casting defects with causes and remedies (blow holes, shrinkage cavity, cold shut, misrun, hot tear).

Long questions

- Explain the steps of sand casting with a labelled sketch of a mould.
- Explain investment casting, die casting and centrifugal casting with their applications.
- Explain Chvorinov's rule and its use in riser design.

Numericals

- A steel casting must be 200 mm long. Shrinkage allowance is 2%. Find the pattern length (ignore other allowances). *Outline:* $L_{pattern} \approx 200 \times 1.02 =$ **204 mm**.
- Compare solidification times of a cube of 100 mm side and a sphere of the same volume using Chvorinov's rule. *Outline:* $t = B(V/A)^2$. For the cube $V/A = 100/6 \approx 16.7$ mm. For the sphere of equal volume, $r \approx 62.0$ mm and $V/A = r/3 \approx 20.7$ mm. The sphere solidifies more slowly, by about $(20.7/16.7)^2 \approx$ **1.54 times**, which is why risers are often made with a low surface-to-volume ratio.

Unit 2: Metal forming

Definitions and short questions

- Differentiate hot working and cold working with advantages of each.
- Define recrystallisation temperature.
- What is the difference between forging, rolling, extrusion and wire drawing?
- Compare direct and indirect extrusion.
- What is spring-back in sheet metal bending?

Long questions

- Explain the rolling process with a sketch showing the roll gap, neutral point and angle of bite.
- Explain open die and closed die forging. List common forging defects.
- Explain sheet metal operations: blanking, punching, bending and deep drawing.

Numericals

- Find the maximum possible draft in rolling for $\mu = 0.1$ and roll radius 300 mm. *Outline:* $\Delta h_{max} = \mu^2 R = 0.01 \times 300 =$ **3 mm**.
- Find the blanking force for a 50 mm diameter blank from a 2 mm sheet with shear strength 300 MPa. *Outline:* $F = \pi \times D \times t \times \tau = \pi \times 50 \times 2 \times 300 \approx$ **94.2 kN**.

Unit 3: Welding

Definitions and short questions

- Classify welding processes into fusion and solid state.
- What are the three types of oxy-acetylene flame and their uses?
- Differentiate AC and DC arc welding. What is arc blow?
- Explain the heat affected zone (HAZ).
- List five welding defects with causes (porosity, slag inclusion, undercut, lack of fusion, cracks).

Long questions

- Explain shielded metal arc welding (SMAW), TIG and MIG welding with sketches and compare them.
- Explain resistance spot welding and seam welding.
- Explain friction welding and its advantages.

Numerical

- An arc welding job uses 25 V and 200 A at a travel speed of 5 mm/s with a heat transfer efficiency of 0.8. Find the heat input per unit length. *Outline:* $H = \eta VI/v = 0.8 \times 25 \times 200/5 =$ **800 J/mm**.

Unit 4: Metal cutting and machine tools

Definitions and short questions

- Differentiate orthogonal and oblique cutting.
- Name the angles in a single-point cutting tool signature.
- What types of chips form in machining and under what conditions?
- Define tool life. What factors affect it?
- What is a built-up edge?

Derivations and long questions

- Draw Merchant's circle diagram and derive the relations between cutting force, thrust force, shear force and friction force.
- Derive the shear angle relation: $\tan \varphi = r \cos \alpha/(1 - r \sin \alpha)$.
- Explain the lathe, its main parts and operations (turning, facing, taper turning, thread cutting).
- Compare shaping, milling, drilling and grinding.

Numericals

- In orthogonal cutting, rake angle $\alpha = 10°$ and chip thickness ratio $r = 0.5$. Find the shear angle. *Outline:* $\tan \varphi = 0.5 \times \cos 10°/(1 - 0.5 \times \sin 10°) = 0.4924/0.9132 \approx 0.539$, so $\varphi \approx$ **28.3°**.
- Using Taylor's equation $VT^n = C$ with $n = 0.25$ and $C = 300$ (V in m/min, T in min), find tool life at 150 m/min. *Outline:* $T = (C/V)^{(1/n)} = 2^4 =$ **16 min**.
- A 50 mm bar is turned at 500 rpm with a feed of 0.2 mm/rev over a length of 200 mm. Find cutting speed and machining time for one pass. *Outline:* $V = \pi DN/1000 \approx$ **78.5 m/min**. $t = L/(fN) = 200/(0.2 \times 500) =$ **2 min**.

Unit 5: Non-traditional machining and powder metallurgy

Definitions and short questions

- Why are non-traditional machining processes needed?
- State the principle of EDM, ECM, USM, LBM and abrasive jet machining.
- What is the function of the dielectric fluid in EDM?
- List the main steps in powder metallurgy.

Long questions

- Explain electric discharge machining with a sketch, its process parameters and applications.
- Explain electrochemical machining and compare it with EDM.
- Explain the powder metallurgy process: powder production, blending, compaction, sintering and finishing, with applications.

Numerical

- In ECM, find the material removal rate using Faraday's law for a given current, atomic weight, valency and density. *Outline:* MRR (mass) = (I × A)/(n × F), where F = 96,500 C. Divide by density to get volume removal rate. Keep units consistent.

How to score well in Manufacturing Processes

- **Draw every process.** A labelled sketch for casting, forging, EDM or welding often earns half the marks.
- **Use tables.** Defects, causes and remedies fit neatly in a three-column table.
- **Compare clearly.** For "differentiate" questions, give at least five points side by side.
- **Practise short numericals.** Taylor's equation, shear angle and machining time take five minutes each.
- **Link to real parts.** Mention one real application for each process, such as crankshafts for forging.

Frequently asked questions

Are these Manufacturing Processes questions from past papers?

No. They are practice questions based on common B.Tech syllabus topics. Check your university syllabus and official papers, such as the AKTU old question paper page.

Which topics are most important in Manufacturing Processes?

Casting allowances and defects, rolling and forging, arc welding processes, Merchant's circle, Taylor's tool life equation and EDM or ECM appear in most syllabi.

How important are diagrams in this subject?

Very important. Most theory answers expect a labelled sketch of the process. Practise drawing each process quickly and neatly.

Which numericals should I practise?

Shear angle from chip thickness ratio, Taylor's tool life, cutting speed and machining time, maximum draft in rolling, blanking force and welding heat input.

Is Manufacturing Processes the same as Production Technology?

The topics overlap a lot, but each university arranges them differently. Check your own syllabus to see which processes are included.

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Sources and further reading

- AKTU old question papers (official)
- NPTEL courses
- AICTE (model curriculum and approvals)

About this PDF

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