EvaExam	MT19old / manufacturing technology exam AKL old curriculum (before 2017)	Electric Paper EVALUATIONSSYSTEME

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50 minutes

Mark as shown: ☐ ☒ ☐ ☐ ☐ Please use a ball-point pen or a thin felt tip. This form will be processed automatically.

Correction: ☐ ■ ☐ ☒ ☐ Please follow the examples shown on the left hand side to help optimize the reading results.

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First name: _____

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In order for your exam to be processed correctly please make sure you enter your examinee-ID precisely into both of the fields provided for it. All pages are entirely individualized and cannot be replaced by pages of other exam sheets.

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important notes:

Please fill your name and enrollment number correctly into the field above. Think and understand the system before you start writing.

Please write only into the boxes. Everything that is not within the boxes will be disregarded in marking. It is recommended to think thoroughly before writing. Eventually use other area of sheet (not in boxes) as area for "scribbling". Scribble somewhere outside the answer box first, then write your final answer into the answer box.

Only use allowed aides: (calculator). The use of scripts and notes is not permitted.

The attempt of cheating will lead to a score of zero.

Write legibly and with a fine high-contrast pen (ideally black or blue fine liner)

In multiple or single choice questions, please consider that you get negative score for wrong answers. The scoring system is explained in the text of the task.

In single or multiple choice questions, fill the boxes precisely as explained above! make a nice "X" (cross) within the box. To correct, fill the box with the wrong "X" totally and make a new "X" in the other box. This means, you can only correct once. If you do not comply with the filling instruction, you risk that you will not get any score for this tasks (and the instruction and this warning have been thorough).

Successful exam writing is also a matter of tactics. Do not spend too much time on one task before you have not looked at all tasks briefly. Consider the importance (score) of the tasks (the score is put in brackets behind each task)

1. Open questions. Please write a brief answer into the box. If you need room for scribbling, use any space outside the answer boxes. Only the content of the boxes will be regarded for marking. Please give a brief answer (no long sentences)

1.1 Name the six main groups of manufacturing technology according to DIN 8580.
The sequence does not matter (name them in any sequence)
(6 pts)

cutting
joining
shaping
deforming
coating
changing material properties

1.2 Imagine you have a milling process with a spindle speed of 1200 rpm, a milling tool with 4 blades, a feed of 0.2 mm per blade and a rake angle of 15°. The tool is TiN-coated, and the cobalt content of the tool is 8%
What is the feed rate (with unit)? Show your calculation! (5 pts)

1200*0,2*4=960

1.3 What does "tesselation" mean in the context of manufacturing?
Please give a brief and crisp answer.
(3 pts)

1. Open questions. Please write a brief answer into the box. If you need room for scribbling, use any space outside the answer boxes. Only the content of the boxes will be regarded for marking. Please give a brief answer (no long sentences) [Continue]

1.4 Name at least three criteria which are used to judge the machinability of a workpiece material (3 pts)

capability
accuracy
enviromental behavior
reliability

1.5 Explain the difference between a pattern and a mold in sand casting.
(3 pts)

Molding is the process of manufacturing by shaping liquid or pliable raw material using a rigid frame called a mold or matrix. This itself may have been made using a pattern or model of the final object. The liquid hardens or sets inside the mold, adopting its shape.

1.6 What are the three main volume components of a grinding wheel?
(Consider the abrasive part only, not the spindle mount hub etc).
(3 pts)

grits,bonding and pores

2. Single choice questions, i.e. exactly one answer is correct.
right answer +1 point1
wrong answer -1 point
no answer: zero points

make sure you check the box and make corrections in the right way (see explanation on top of the exam header)

2.1 Fused deposition modeling is an additive manufacturing technology in which ...
- ☐ powder is used as raw material
- ☐ the raw material is fed into the process as a vapor.
- ☑ a fiber is used as raw material
- ☑ the raw material has liquid state (ink jet technology)

2.2 In deforming, stretch forming and bending are competing technologies to create curved sheet metals. Which one has the lower springback effect?
- ☐ bending
- ☑ stretch forming

2. Single choice questions, i.e. exactly one answer is correct.
right answer +1 point1
wrong answer -1 point
no answer: zero points

make sure you check the box and make corrections in the right way (see explanation on top of the exam header) [Continue]

2.3 What is one of the main differences between deep drawing and stretch forming?
- ☐ In deep drawing, the maximum thickness of the sheets that can be deformed is higher than in stretch forming
- ☑ In deep drawing, the sheet thickness remains constant wheras it gets thinner in stretch forming

2.4 Tailored blanks are....
- ☐ workpieces which are deformed close to the final desired workpiece shape which then are milled or ground to the final shape
- ☑ sheet metal pieces that are welded together from different materials or thicknesses which shall be deformed afterwards

2.5 How is the true strain of a deforming process calculated (referring to a simple upsetting process as explained in the lecture)? (h: height, index 0 : prior to deforming)
- ☐ $phi_z = ln (h_0/h_1)$
- ☑ $phi_z = ln (h_1/h_0)$
- ☐ $phi_z = (h_1-h_0)/h_1$

2.6 In hot extrusion, the recrystallization process takes place during the deforming process.
- ☐ True
- ☑ False

2.7 Strain hardening....
- ☑ ... can be reversed (undone) by recrystalization glowing
- ☐ ... is an unwanted effect that can be considered as one of the main disadvantages of deforming technologies

2.8 The flow stress of the workpiece in deforming...
- ☑ ...decreases with increasing workpiece temperature
- ☐ ...increases with increasing workpiece temperature
- ☐ ... is not depending on the workpiece temperature

2.9 Injection moulding is....
- ☐ ... a casting operation with lost mold
- ☑ ... a casting operation with reusable mold
- ☐ ... a mold-making process based on additive manufacturing (fused deposition modeling)
- ☐ ... a mold-making process based on additive manufacturing (selective laser melting)

2.10 Which parameter will lead to a significant change in cutting force if you change it (and keep all other parameters constant)?
- ☐ tool coating
- ☑ feed

2.11 To change a process from wet cutting to dry cutting, ...
- ☐ only feed and cutting speed have to be readjusted (in most cases)
- ☑ more than these two parameters have to be readjusted (in most cases)

2.12 "Grinding burn" is a collateral damage in manufacturing in which the workpiece material is unintentially hardened during a grinding process
- ☑ Right
- ☐ Wrong

2.13 Reaming is used to increase the accuracy and surface quality of boreholes
- ☑ Right
- ☐ Wrong

2. Single choice questions, i.e. exactly one answer is correct.
right answer +1 point1
wrong answer -1 point
no answer: zero points

make sure you check the box and make corrections in the right way (see explanation on top of the exam header) [Continue]

2.14 Some ceramics can be cut with electrical discharge machining
- ☑ Right
- ☐ Wrong

2.15 The typical attribute of gun drilling is that a borehole is created in a very hard workpiece material
- ☐ Right
- ☑ Wrong

2.16 The machining rates that are obtained with EDM are equal to or slighty lower than those that can be achieved with milling
- ☐ Right
- ☑ Wrong

machining rate is extermly low for EDM

2.17 Hobbing is...
- ☑ a special milling operation used to make gears
- ☐ a machining technology used to manufacture hubs by pulling a long tailor-made tool through the borehole

2.18 Which cutting material has the higher toughness?
- ☑ high speed steel
- ☐ cemented carbide

2.19 What is one of the main motivations to apply EDM technology instead of milling?
- ☐ manufacturing of non-cylindrical boreholes
- ☑ manufacturing of sharp edges

2.20 In longitudinal turning, increasing the cutting speed will lead to decreasing kinematic roughness (if feed and all other parameters stay constant).
- ☐ Right
- ☑ Wrong

2.21 In longitudinal turning, a change in cutting depth will lead to a change of the chip thickness.
- ☑ Right
- ☐ Wrong

2.22 In the cutting tool material properties dilemma, what are the relevant material properties of the cutting material?
- ☑ Hardness and toughness
- ☐ Thermal conductivity and hardness