UNIVERSITY
OF SKÖVDE

School of Engineering Science

WRITTEN EXAMINATION

Course: Alternative Manufacturing Methods, A1N

Sub-course: Written Examination

Course code: VP716A

Credits for written examination: 4 ECTS

Date: 2023-10-25

Examination time: 08.15-12.30

Examination responsible: Assoc. Professor, Dr Lennart Y. Ljungberg

Teachers concerned: Examiner, Dr Wei Wang

Aid at the exam/appendices: Only language dictionaries

Other: Assoc. Professor L.Y. Ljungberg can be contacted by telephone through the examination attendants.

Instructions:

- ☐ Take a new sheet of paper for each teacher.
- ☐ Take a new sheet of paper when starting a new question.
- ☒ Write only on one side of the paper.
- ☒ Write your name and personal ID No. on all pages you hand in.
- ☒ Use page numbering.
- ☒ Don´t use a red pen.
- ☒ Mark answered questions with a cross on the cover sheet.

Grade points:

Maximum: 20p
Not Passed < 10p

The exact grades (according to the course P.M.) will be determined based on the course objectives. (The notifications in brackets after some questions refers to the relevant chapters in the course book or Handouts!)

Examination results should be made public within 18 working days!

Good luck!

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Part A. Short answers. Motivate your answers! 1 p per task!

1. **Hybride processes.** Describe and draw a simple figure of a typical hybride process (Ch 27.10)

2. **Water-jet machining.** Briefly describe the Water-jet machining process and why abrasive-jet machining is of interest in certain applications. (Ch 27.8, 27.9)

3. **FRP (Fiber Reinforced Plastics).** Describe and make a simple drawing which shows the principle for how to create stiff plates (e.g. walls in a construction) made of FRP. (Ch 9.2)

4. **Electrochemical grinding.** Explain the principles for electrochemical grinding. (Ch 27.4)

5. **Material Structure.** Describe briefly how plastic deformation in a metal takes place related to the atomic structure. (Ch 1.3)

Part B. Detailed answers. Motivate your answers when possible! If possible draw figures, even when this is not required! 3 p per task!

6. **Materials Selection**. Give an example how material selection can be done for a certain product. Describe the principles for a specific case.
(See Handout)

7. **Thermal spraying.** Describe how thermal spraying can be performed and examples of some relevant applications related to various products. (34.5)

8. **Laser machining.** Describe the following principles related to laser machining:
   a) Creation of the laser beam. (I. e. Principles for how a laser beam is created)
   b) Examples of major advantages of LBW (Laser Beam Welding) over EBW (Electronic Beam Welding)

   (27.6 and 30.7)

9. **PM.** Explain with text and figures the principles for Powder Metallurgy including advantages and disadvantages with this method. (17)

10. **Feature Based Machining (FBM)**. Describe the concept of FBM and its implementation procedure.