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学院 School		专业班级 Class		学号 Student ID		姓名 Name	
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Test Paper of Wuhan University of Technology (B)

2018~2019 Academic Year 2nd Semester, Course: Automotive
Manufacturing Engineering, Closed-book exam

Time: 120 mins, 56 class hours, 3.5 credits, Total Points: 100, Percent in final
evaluation result: %, Date: April, 2019

No.	I	II	III	IV	V	VI	VII	VIII	IX	X	Total
Full score	25	24	28	23							100
Score											

Score	
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QUESTION I (25 Points)

1. What is the machining process? What are the two major categories? What are the characteristics of them respectively? (6 points)
2. What is the economic accuracy of processing? (4 points)
3. Brief introduce the methods of obtaining workpiece shape. (3 points)

4. What is the process route? What are the main contents of the proposed process route? (6 points)

5. What is the machining process specifications? What are the technological documents in the machining process? (6 points)

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QUESTION II (24 Points)

6. According to the processing requirements to mill a groove on a rectangular iron block as shown in Figure 1, to ensure the process size A, B, H, analyze the degree of freedom that must be limited for correct positioning of the part. (6 points)

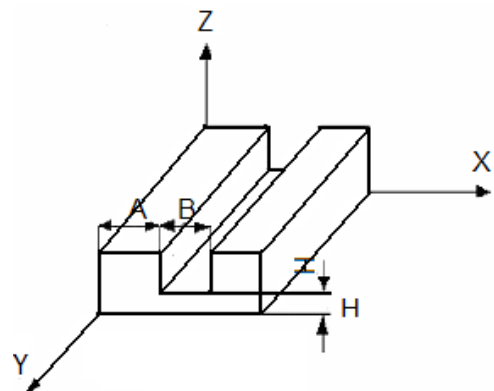


Figure 1

7. When the connecting rod is positioned on the special machine tool fixture by plane bearing 1, short cylindrical pin 2 and locating slot 3 as shown in Figure 2, please analyze the degree of freedom limited for positioning elements. (6 points)

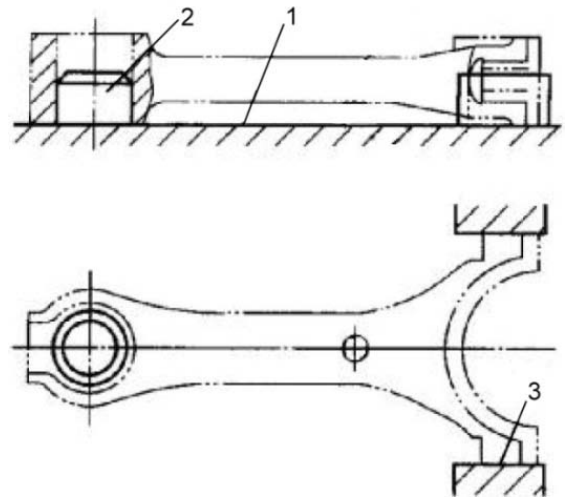


Figure 2

8. As shown in Figure 3, the workpiece, with the center of inner bore O as a locating basis, is placed on the center of mandrel O_1 , and the upper plane is processed to ensure $A \pm \delta A$. The bore diameter of the workpiece is $D_0^{+\delta D}$, the diameter of the mandrel is $d_{-\delta d}^0$, the minimum fit clearance between the bore and axis is X (the minimum bore diameter minus the maximum axis diameter), please analyze: (12 points)

- (1) Positioning error when the locating mandrel is placed horizontally;
- (2) Positioning error when the locating mandrel is placed vertically.

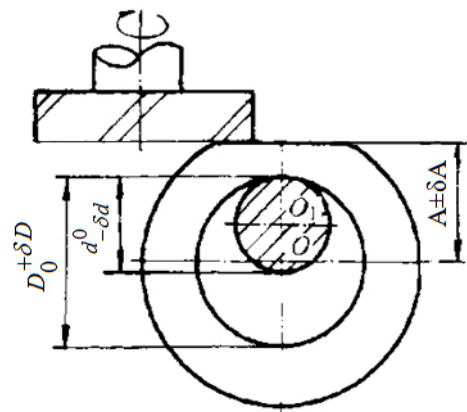


Figure 3

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QUESTION III (28 Points)

9. Figure 4 shows a parallel dimension chain, in Dimension Chain A, $A_0 = 0^{+0.50}_{+0.10} mm$, $A_1 = 35^{+0.24}_{+0.11} mm$, $A_2 = 6^0_{-0.075} mm$, $A_3 = 16mm$, $A_4 = 25^{+0.084}_0 mm$; in Dimension Chain B, $B_0 = 2^{+0.40}_{+0.10} mm$, $B_1 = 18mm$, please analyze: (14 points)

- (1) Separately determine the increasing and decreasing links in Dimension Chain A and B;
- (2) Tolerance and limit deviation of B1 and B2.

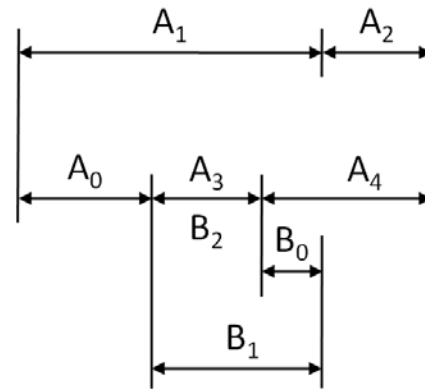


Figure 4

10. Figure 5 shows the reverse gear device, the designed assembly accuracy $A_0=0.1\sim 0.4\text{mm}$, $A_1 = 42.8^{+0.16}_0 \text{mm}$, gasket $A_2 = A_4 = 2.4^0_{-0.04} \text{mm}$ (standard part), and gear width $A_3 = 38^0_{-0.06} \text{mm}$, please check whether the dimensional tolerance and limit deviation are correct by checking and calculating the tolerance. If there is an error, please correct the original design. (14 points)

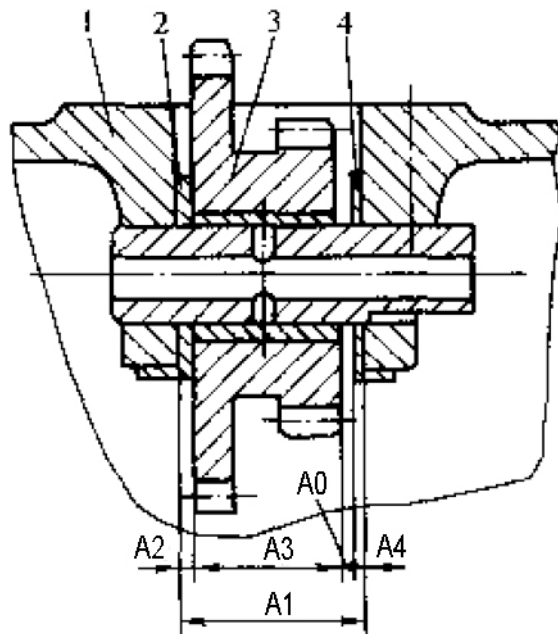


Figure 5

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QUESTION IV (23 Points)

11. In view of the rules with which the error occurs when a batch of piecework is processed, what are the categories of machining errors? How to eliminate these errors? (6 points)

12. (1) Briefly describe the main measures to improve the rigidity of machine tool components. (2) Analyze the reasons why the processed axial workpiece is of the shape “saddle” (Figure 6a) from the aspect of the influence of the rigidity of machine tool on the machining accuracy. (3) Analyze the reasons why the processed axial workpiece is of the shape “waist drum” (Figure 6b) from the aspect of the influence of the rigidity of workpiece on the machining accuracy. (10 points)

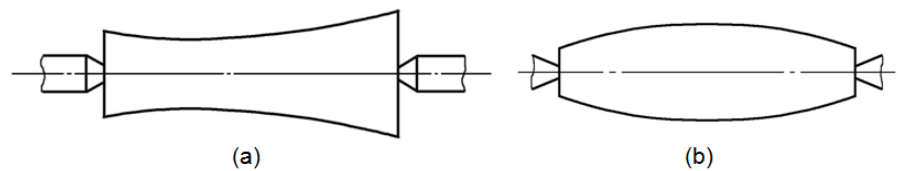


Figure 6

13. A horizontal lathe produced by a machine tool plant is shown in Figure 7. If the guide rail of the lathe has a straightness error $\Delta y = 0.03\text{mm}$ in the horizontal plane, an error from cylindrical form will occur when the lathe is used to process a long axis. Please calculate the error value, and thus describe the sensitive direction of error and its characteristics. (7 points)

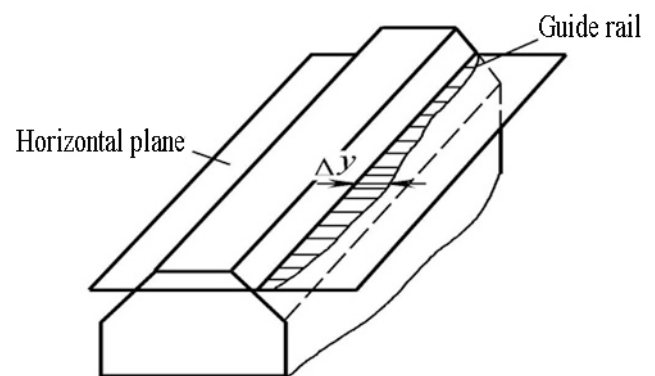


Figure 7

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