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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER II
SESSION 2018/2019**

COURSE NAME : MANUFACTURING PROCESSES
COURSE CODE : BPC 22203
PROGRAMME CODE : BPB
EXAMINATION DATE : JUNE / JULY 2019
DURATION : 3 HOURS
INSTRUCTION : ANSWER ALL QUESTIONS

THIS QUESTION PAPER CONSISTS OF FIVE (5) PAGES

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Q1 (a) Explain the following metal forming processes with appropriate illustration.

(i) Impression die forging. (4 marks)

(ii) Ring rolling. (4 marks)

(b) A 400 mm-wide strip 30 mm thick is fed through a rolling mill with two powered rolls with radius of 280 mm. The work thickness is to be reduced to 23 mm in one pass at a roll speed of 50 rev/min and average flow stress of 367 MPa.

Calculate the roll force. (6 marks)

(c) A sheet metal blank with the thickness of 4.0 mm and width of 52.3 mm is to be bent. The metal has yield strength of 275 MPa and tensile strength of 590 MPa.

Calculate the bending force if an edge die is used with a die opening dimension of 35 mm.

(6 marks)

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- Q2** (a) Explain **TWO (2)** differences between peripheral milling and face milling. (4 marks)
- (b) Explain the function of component A, B, C, and D as shown in **Figure Q2**.

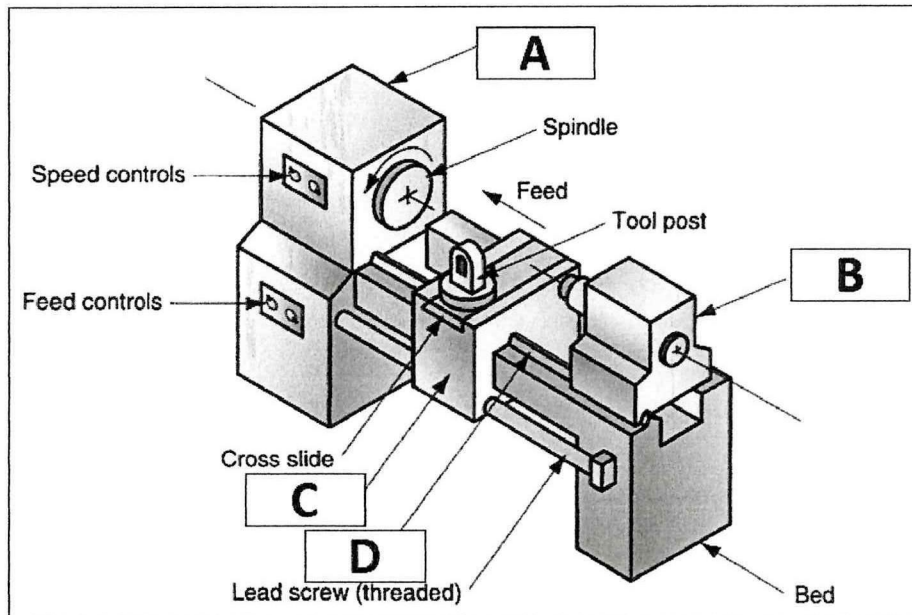


Figure Q2: Schematic diagram of an engine lathe.

- (c) A cylindrical workpart 200 mm in diameter and 700 mm long is to be turned in an engine lathe. Given that cutting speed = 2.30 m/s, feed = 0.32 mm/rev, and depth of cut = 1.80 mm. (8 marks)

Calculate:

- (i) Cutting time (4 marks)
- (ii) Metal removal rate (4 marks)

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- Q3** (a) Explain the **TWO (2)** importance of annealing. (4 marks)
- (b) Explain the following surface hardening processes.
- (i) Carburizing (2 marks)
 - (ii) Nitriding (2 marks)
 - (iii) Boronizing (2 marks)
- (c) List **FOUR (4)** examples of chemical surface cleaning operation. (4 marks)
- (d) **Figure Q3** shows the surface texture symbols in engineering drawing.

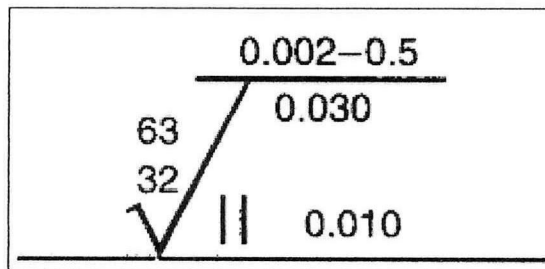


Figure Q3: Surface texture symbols in engineering drawing.

Identify the value of cut-off length, maximum surface roughness, and maximum waviness height.

(6 marks)

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- Q4** (a) Explain the heat-affected zone of welding with appropriate illustration. (8 marks)
- (b) The power source in a particular welding setup generates 3500 W that can be transferred to the work surface with a heat transfer factor = 0.7. The metal to be welded is low carbon steel with melting temperature of 1760 K. The melting factor in the operation is 0.5. A continuous fillet weld is to be made with a cross-sectional area = 20 mm².
- Calculate:
- (i) The unit energy required to melt the metal. (6 marks)
- (ii) The travel velocity of the welding operation. (6 marks)
- Q5** (a) Explain the working principle of 3D printing technology. (8 marks)
- (b) Explain **THREE (3)** limitations of 3D printing technology. (6 marks)
- (c) Explain **THREE (3)** importance of nanotechnology. (6 marks)

- END OF QUESTIONS -

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