

Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
**FOURTH SEMESTER B.TECH DEGREE EXAMINATION, APRIL 2018**

**Course Code: MP202**

**Course Name: MACHINING OF MATERIALS (PE)**

Max. Marks: 100

Duration: 3 Hours

**PART A**

*Answer any three full questions, each carries 10 marks.*

Marks

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|---|--|-----|
| 1 | a) What are the various requirements a tool designer need to consider while selecting tool materials for the manufacture of cutting tools?   | (7) |
|   | b) Explain the classification of machine tools using multipoint cutting tools  | (3) |
| 2 | a) With a neat sketch, briefly discuss the various parts and angles of a single point cutting tool.  | (8) |
|   | b) For a single-point turning tool of specification $10^\circ - 8^\circ - 6' - 10' - 15^\circ - 45^\circ - 1 \text{ mm}$ (ORS geometry), determine the normal rake and normal clearance angles.  | (2) |
| 3 | a) Discuss built-up-edge formation and characteristics of BUE  | (7) |
|   | b) In an orthogonal turning operation,<br>Cutting speed = 80 m /min      Cutting force = 20 kg<br>Feed force = 8 kg              Back rake angle = $15^\circ$<br>Feed = 0.2 mm/rev              Chip thickness = 0.4 mm<br>Determine the following:<br>i) Shear angle      ii) Shear strain. | (3) |
| 4 | a) Elaborate the mechanism behind chip formation while machining ductile materials.  | (7) |
|   | b) Discuss the conditions favouring the formation of different chip forms.   | (3) |

**PART B**

*Answer any three full questions, each carries 10 marks.*

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|---|---|-----|
| 5 | a) Explain the purpose and advantages of Merchant's circle diagram.   | (3) |
|   | b) Develop the expressions for the major cutting force components in turning under orthogonal cutting with the help of a Merchant's Circle Diagram.   | (7) |
| 6 | a) The tool bit has a rake angle of $10^\circ$ . If shear strength = $6000 \text{ kg/cm}^2$ , Width of cut = 10 mm, Cutting speed = 30m/min, Coefficient of friction = 0.9, feed is 1.25 mm/rev and chip thickness after cutting is 2 mm, then<br>Determine the following:<br>i) Shear angle    ii) Shearing force    iii) Friction angle    iv) Cutting force. | (8) |
|   | b) Examine the characteristics desired in a tool dynamometer.   | (2) |
| 7 | a) Discuss the sources and causes of heat generation in metal cutting.  | (6) |
|   | b) Briefly explain any two methods used for determining the temperature developed during metal cutting.   | (4) |
| 8 | a) State and explain the different types of cutting fluids employed for reducing cutting temperature along with their applications.   | (6) |

- b) Enumerate the essential properties of a good cutting fluid. (4)

**PART C**

*Answer any four full questions, each carries 10 marks.*

- 9 a) Define machinability rating with a suitable example. (2)  
b) Suggest the various factors influencing the machinability of work materials. (8)
- 10 a) Briefly describe the possible reasons for a tool failure? (6)  
b) What are observations that can be noticed when a given cutting tool is failed? (4)
- 11 a) Illustrate with neat sketches, the two types of tool wear. (5)  
b) A tool life of 80 minutes is obtained at a speed of 30 m/min and 8 minutes at 60 m/min. Determine the following: (5)  
i) Tool life equation ii) Cutting speed for 4 minutes tool life
- 12 a) List the various types of cutting tool materials used in metal cutting process. (2)  
b) Discuss the characteristics and applications of advanced cutting tool materials. (8)
- 13 Write short notes on the following.  
a) Choice of parameters in economics of machining (4)  
b) With neat sketch discuss the elements of plasma cutting equipment used in Plasma Arc Machining (PAM). (4)  
c) Characteristics of Laser Beam Machining (LBM) (2)
- 14 Discuss Abrasive Jet Machining (AJM) in terms of: (10)  
i) Principle of operation with neat sketch ii) Disadvantages iii) Applications

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