

Code No: RT31032

R13

SET - 1

III B. Tech I Semester Regular/Supplementary Examinations, October/November- 2017

METAL CUTTING & MACHINE TOOLS

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)

2. Answering the question in **Part-A** is compulsory

3. Answer any **THREE** Questions from **Part-B**

PART -A

- 1 a) What are the different types of chips formed during metal cutting process? [3M]
- b) How are lathe sizes determined? [4M]
- c) Why are straight flute drills used for non-ferrous material and sheet metal? [4M]
- d) List out the merits of indexing method on milling machine. [4M]
- e) What are the applications of super finishing operations? [4M]
- f) What are the advantages of using jigs and fixtures? [3M]

PART -B

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|---|--|------|
| 2 | a) Explain about the rake angle requirement for ductile work materials? | [4M] |
| | b) Draw Merchant's force diagram. State the assumptions made in the development of such a diagram. | [8M] |
| | c) What are the factors influencing the formation of various types of chips. | [4M] |
| 3 | a) Sketch and explain a method used for taper turning of long jobs. | [5M] |
| | b) What is the field of application of turret lathe? How does it differ from engine lathe? | [8M] |
| | c) What are the principle features of automatic lathes? | [3M] |
| 4 | a) Describe the principle of operation of a shaper. | [8M] |
| | b) What are the different types of drills? Explain with neat diagram. | [8M] |
| 5 | a) Explain the following milling operations:
i) Straddle milling ii) Gang milling | [8M] |
| | b) What is indexing? Describe direct indexing, with example. | [8M] |
| 6 | a) Sketch and explain the tool and cutter grinding machine. | [8M] |
| | b) Bring out the differences between Lapping and Honing. | [8M] |
| 7 | a) What factors govern the choice of a clamping device to achieve the purpose of clamping? Discuss them in detail. | [8M] |
| | b) List out the advantages and applications of using CNC machine tools. | [8M] |

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R13**SET - 2**

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2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**
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PART -A

- 1 a) Explain the uses of back rake and side rake angles. [3M]
b) What are the different types of work holding devices used on Lathe machine? [4M]
c) Describe the operation of cutting T-Slots on a shaper. [4M]
d) Explain Straddle milling with a neat sketch. [4M]
e) List out the advantages of centreless grinding. [3M]
f) Write short notes on 3-2-1 location principle. [4M]

PART -B

- 2 a) What factors will greatly influence the cutting tool material? [4M]
b) What are the various types of chips? Under what conditions is each formed? [8M]
c) Write short notes on crater wear and flank wear. [4M]
- 3 a) What are the difference between a face plate and a drive plate? [3M]
b) Give a short description about the various operations that can be performed on an engine lathe. [8M]
c) Describe the essential parts of a turret lathe. [5M]
- 4 a) Sketch and describe any one quick return mechanism of shaper. [8M]
b) Sketch and describe the essential elements of a two-flipped twist drill. [8M]
- 5 a) Name the various milling attachments? Explain universal milling with neat diagram. [8M]
b) What are the fundamental differences in structure of a column type milling machine and knee type milling machine. [8M]
- 6 a) Mention the various types of bonds used in the making of grinding wheel. Also mention their applications. [8M]
b) Explain the operations performed by a broaching machine. [8M]
- 7 a) What are the essential characteristics in the proper design of jigs and fixtures? [8M]
b) What are the types of motion controls available in CNC machines? [8M]

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R13**SET - 3**

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2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

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**PART -A**

- |   |                                                       |      |
|---|-------------------------------------------------------|------|
| 1 | a) What is the cause of built up edge?                | [3M] |
|   | b) Differentiate between Turret and Capstan lathes.   | [4M] |
|   | c) How are drill sizes designated?                    | [4M] |
|   | d) What are the applications of end milling?          | [3M] |
|   | e) How to specify grinding machine?                   | [4M] |
|   | f) Explain the working principle of CNC machine tool. | [4M] |

**PART -B**

- |   |                                                                                                                        |      |
|---|------------------------------------------------------------------------------------------------------------------------|------|
| 2 | a) What are the factors influencing in selection of cutting speeds and feeds for machining operation?                  | [7M] |
|   | b) State the conditions under positive and negative rake angles are recommended.                                       | [6M] |
|   | c) Define the term 'tool life'.                                                                                        | [3M] |
| 3 | a) How do you specify a lathe machine?                                                                                 | [4M] |
|   | b) Explain in detail the single-spindle automatic lathe and compare it with multi-spindle automatic lathe.             | [8M] |
|   | c) Enumerate the design considerations to be taken into account for producing high quality screw threads economically. | [4M] |
| 4 | a) Describe some of the methods used for holding work on shaper and planer tables.                                     | [8M] |
|   | b) Differentiate between counter boring, counter sinking and spot facing.                                              | [8M] |
| 5 | a) Describe the various types of cutters commonly used on milling machine.                                             | [8M] |
|   | b) What is the difference between conventional and climb milling? When is each used?                                   | [8M] |
| 6 | a) Discuss in detail about internal cylinder grinding.                                                                 | [8M] |
|   | b) Compare honing, lapping and buffing operations.                                                                     | [8M] |
| 7 | a) What are the important principles of jig design? Explain.                                                           | [8M] |
|   | b) Discuss the construction features of CNC Machines.                                                                  | [8M] |

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**R13****SET - 4**

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(Mechanical Engineering)

Time: 3 hours

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- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)  
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3. Answer any **THREE** Questions from **Part-B**
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**PART -A**

- |   |                                                              |      |
|---|--------------------------------------------------------------|------|
| 1 | a) What is meant by tool signature?                          | [3M] |
|   | b) What special tooling is associated with the turret lathe? | [4M] |
|   | c) How is the size of shaper and planer specified?           | [4M] |
|   | d) How can sawing be done on milling machine?                | [4M] |
|   | e) What are the functions of a grinding fluid? Explain.      | [4M] |
|   | f) List the common types of drilling jigs and their uses?    | [3M] |

**PART -B**

- |   |                                                                                                                                                                                                                                                                                                                                              |      |
|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 2 | a) Explain the following terms in relation to lathe:<br>(i) Cutting speed (ii) Depth of cut (iii) Feed.                                                                                                                                                                                                                                      | [6M] |
|   | b) List the common type of tool materials that are used for turning.                                                                                                                                                                                                                                                                         | [4M] |
|   | c) A carbide tool with mild steel workpiece was found to give life of 2 hours while cutting at 0.50 mpm. Compute the tool life if the same tool is used at a speed of 25% higher than the previous one. Also determine the value of cutting speed if the tool is required to have tool life of 3 hours. Assume Taylor's exponent 'n' = 0.27. | [6M] |
| 3 | a) Explain briefly the following lathe operations:-<br>i) Facing ii) Threading iii) Knurling iv) Forming                                                                                                                                                                                                                                     | [8M] |
|   | b) Explain any three methods of taper turning on a lathe.                                                                                                                                                                                                                                                                                    | [8M] |
| 4 | a) Differentiate between shaping, planning and slotting machines.                                                                                                                                                                                                                                                                            | [8M] |
|   | b) What are vertical boring machines? Where they are preferred and why?                                                                                                                                                                                                                                                                      | [8M] |
| 5 | a) Sketch a milling cutter tooth and indicate rake, clearance and lip angle.                                                                                                                                                                                                                                                                 | [8M] |
|   | b) What machining operations can be done on a milling machine?                                                                                                                                                                                                                                                                               | [8M] |
| 6 | a) Discuss the effect of abrasive, grain size, grade, structure and bonding on the performance of a grinding wheel.                                                                                                                                                                                                                          | [8M] |
|   | b) What is centre less grinding? Explain with neat diagram.                                                                                                                                                                                                                                                                                  | [8M] |
| 7 | a) What are the main differences between the jigs and fixture?                                                                                                                                                                                                                                                                               | [8M] |
|   | b) Discuss the classification of CNC Machine tools.                                                                                                                                                                                                                                                                                          | [8M] |

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