Code No: R1631032 **R16** SET - 1

III B. Tech I Semester Regular/Supplementary Examinations, October/November - 2019

METAL CUTTING AND MACHINE TOOLS

(Mechanical Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **FOUR** Questions from **Part-B**

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PART –A (14 Marks)

1. a) List out the various types of cutting fluids. [2M]
   b) Sketch a block diagram of a turret lathe. Name its major parts. [3M]
   c) How the jobs are held on the table of a horizontal shaper? [2M]
   d) What type of surfaces can be produced by a milling process? [2M]
   e) What is meant by dressing and truing? [3M]
   f) Differentiate between NC and CNC. [2M]

PART –B (56 Marks)

2. a) How is metal removed in metal cutting? Explain the process by giving any simple model for metal removal. [7M]
   b) During a metal cutting test under orthogonal conditions in a lathe with a tool of rake angle 20^0, with a depth of cut 3 mm and feed rate of 0.38 mm/rev, the following data is recorded: [7M]
   Average chip thickness=0.89 mm,
   Horizontal component of the cutting force =1600 N,
   Vertical component of the cutting force =2340 N,
   Calculate the following:
      i) Coefficient of friction at the chip tool interface
      ii) Shear plane angle
      iii) Shear stress at the shear plane.

3. a) What are the various methods available for taper turning in a lathe? Explain their specific advantages and limitations. [7M]
   b) Is the productivity of multi-spindle machines higher compared to a single –spindle automatic lathe? Explain your answer. [7M]

4. a) Give a schematic sketch of a shaper labeling the important parts and their functions. [7M]
   b) Explain the differences between drilling, the reaming and tapping. [7M]

5. a) Describe the application and relative merits of various types of milling cutters used in milling. [8M]
   b) Explain any one indexing method on Universal Dividing Head. [6M]

6. a) Explain the principle of operation of cylindrical grinding with a neat diagram. [8M]
   b) How is grinding different from other machining operations? Explain its applications in view of its capabilities. [6M]

7. a) Explain the basic principles involved in designing a clamping device for a jig or fixture. [7M]
   b) What are the advantages and disadvantages of CNC machines? Explain. [7M]

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Code No: R1631032 **R16** SET - 2

III B. Tech I Semester Regular/Supplementary Examinations, October/November - 2019

METAL CUTTING AND MACHINE TOOLS

(Mechanical Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **FOUR** Questions from **Part-B**

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PART –A (14 Marks)

1. a) What are the standard angles of cutting tools? Describe them. [2M]
   b) How is the size of the engine lathe given? [2M]
   c) Write the uses of a slotter. [2M]
   d) What is feed on a milling machine? [3M]
   e) Why is grinding so important in modern production? [3M]
   f) Define CNC. [2M]

PART –B (56 Marks)

2. a) What are the various forms of wear found in cutting tools? Show with a neat sketch. [8M]
   b) In an orthogonal cutting process following data were observed: Chip length of 80 mm and was obtained with an uncut chip length of 200 mm and the rake angle used was 20^0 and depth of cut 0.5 mm. The horizontal and vertical components of cutting force F_H and F_V were 2000 N and 200 N respectively. Determine the shear plane angle, chip thickness, friction angle and resultant force. [6M]

3. a) What are the various types of automatic lathes you are familiar the multi-spindle category? Explain their differences and applications. [7M]
   b) Write any four operations that can be performed on a lathe machine with Diagrams. [7M]

4. a) Give similarities and differences among shaping, planning and slotting machines with respect to constructed features, applications and working. [6M]
   b) Show with sketches the principal features of any three hole-making operations you are familiar with along with the tools used. [8M]

5. a) Describe the differences between a lathe and milling machine in terms of the types of surfaces generated, the types of tools used, and applicability for general and production applications. [7M]
   b) Explain the construction of a dividing head giving the applications for which it can be used. [7M]

6. a) Explain different ways in which the wear in grinding wheel can take place. What can be done to prevent them? [7M]
   b) Give a simple sketch of a broaching tool and explain various elements. [7M]

7. a) Discuss different types of clamping devices. [7M]
   b) What are the different types of motion controls in CNC machines? Explain. [7M]

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Code No: R1631032 **R16** SET - 3

III B. Tech I Semester Regular/Supplementary Examinations, October/November - 2019

METAL CUTTING AND MACHINE TOOLS

(Mechanical Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **FOUR** Questions from **Part-B**

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PART –A (14 Marks)

1.	a)	Why Cutting fluids are used?	[2M]
	b)	What is the difference between the 'live' and 'dead centre'?	[2M]
	c)	Write the product applications of planer.	[2M]
	d)	List the various types of milling cutters.	[3M]
	e)	Why the natural abrasives are not suitable for making grinding wheels?	[3M]
	f)	Write any two applications of CNC machines.	[2M]

PART –B (56 Marks)

2.	a)	What is meant by built up edge in metal cutting? When it is formed? How to avoid it?	[7M]
	b)	In an orthogonal cutting of steel component with carbide tool, the following data was obtained; Tool rake angel=10^0 Chip width =6 mm Uncut chip thickness =0.10 Chip thickness ratio =0.33 Horizontal cutting force =1290 N Vertical cutting force =1650 N Sketch the force diagram and calculate the mean shear stress on the shear plane.	[7M]
3.	a)	What types of work-holding devices are generally used in a lathe? Give the typical applications, comparative accuracies, precautions and disadvantages for each type of work-holding device.	[9M]
	b)	Explain the difference between Capstan and Turret lathe.	[5M]
4.	a)	Give a neat sketch of a slotter and describe its main parts.	[6M]
	b)	Write a brief note on deep-hole drilling operation.	[8M]
5.	a)	Write on the following milling operations (i) Straddle milling; (ii) Gang milling; (iii) string milling.	[9M]
	b)	Describe the construction of milling cutter.	[5M]
6.	a)	Sketch and explain the various methods of surface grinding.	[7M]
	b)	Write the advantages and limitations of broaching process.	[7M]
7.	a)	Explain the principle of 3-2-1 location.	[7M]
	b)	Describe four features of CNC machines which distinguish them from conventional machine tools.	[7M]

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Code No: R1631032 **R16** SET - 4

III B. Tech I Semester Regular/Supplementary Examinations, October/November - 2019

METAL CUTTING AND MACHINE TOOLS

(Mechanical Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **FOUR** Questions from **Part-B**

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PART –A (14 Marks)

1.	a)	How do you define tool life?	[2M]
	b)	Name the four main parts of a lathe.	[2M]
	c)	Compare 'Boring' and 'reaming' operations.	[3M]
	d)	Define a milling cutter.	[2M]
	e)	Define a broaching operation.	[3M]
	f)	Differentiate between a jig and fixture.	[2M]

PART –B (56 Marks)

2.	a)	Draw merchant circle diagram for metal cutting process and derive relations for various forces in metal cutting.	[7M]
	b)	What are the desirable properties of cutting fluids used in metal cutting? Explain.	[7M]
3.	a)	What is the importance of tool layout in automats? Explain with an example for one type with a component sketch.	[7M]
	b)	Explain the methods used for the generation of threads in lathe.	[7M]
4.	a)	Explain the following principal parts of a mechanical shaper. i) Ram ii) Tool post iii) Quick- return motion.	[7M]
	b)	Explain principle parts of a vertical boring machine with a sketch.	[7M]
5.	a)	Sketch and describe differential indexing method.	[7M]
	b)	What is the difference between face milling and end milling? Explain.	[7M]
6.	a)	What are the advantages and limitations of using centre less grinding?	[6M]
	b)	Distinguish between grinding, lapping and honing machines.	[8M]
7.	a)	What are the essential characteristics in the proper design of jigs and fixture?	[7M]
	b)	What are the advantages and disadvantages of CNC machines? Explain.	[7M]

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