Code No: RT31032 **R13** SET - 1

III B. Tech I Semester Regular Examinations, November - 2015
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**

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PART –A

1	a)	How is tool life defined? Explain the factors affecting tool life.	[4M]
	b)	Explain briefly the numerically controlled turret lathes.	[4M]
	c)	Describe the differences between a planer and a shaper.	[4M]
	d)	State the advantages of down milling process.	[3M]
	e)	Differentiate between Honing and Buffing.	[4M]
	f)	What are the applications of CNC machines? Explain.	[3M]

PART -B

2	a)	The power required while turning mild steel rod is found to be 0.1 kw/cm^2/min. The maximum power available at the machine spindle is 4 KW. Assuming a cutting speed of 38m/min and feed rate 0.32 mm/rev, calculate (i) Maximum metal removal rate, (ii) Depth of cut, (iii) Cutting Force, (iv) Normal pressure on the chip.	[8M]
	b)	Discuss briefly the following tool materials: (i) High speed steels and (ii) Cemented Carbides.	[8M]
3	a)	What are the differences between capstan and turret lathe?	[8M]
	b)	Explain the various types of chucks in detail.	[8M]
4	a)	Calculate the machining time required for making 18 holes on M.S plate of 20mm thickness with the data: Drill diameter =30mm, Cutting speed=25m/min and Feed=0.15mm/rev.	[8M]
	b)	Explain briefly the deep hole drilling machine.	[8M]
5	a)	Explain briefly the following with neat sketches: (i) Straddle milling (ii) Dove-tail milling.	[8M]
	b)	Discuss briefly the vertical milling machine.	[8M]
6	a)	Explain briefly the lapping process. Give the examples of lapping work.	
	b)	Discuss briefly the following: (i) Mounting of wheels (ii) Wheel truing.	[10M]
7	a)	Explain briefly the following with sketches: (a) Clamping screws (b) Quick acting clamps.	[10M]
	b)	Discuss the constructional features of CNC machines.	[6M]

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Code No: RT31032 **R13** SET - 2

III B. Tech I Semester Regular Examinations, November - 2015
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**

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PART –A

1	a)	Explain shear zone with respect to a machining process.	[4M]
	b)	What do you mean by 'Lathe Accessories'?	[3M]
	c)	How is the size of a planer specified?	[3M]
	d)	Explain differences between end milling and face milling.	[4M]
	e)	What is the purpose of honing? Give the examples of honing work.	[4M]
	f)	Describe briefly "Principle of Location".	[4M]

PART -B

2		Explain the effects of the following parameters on chip formation: (i) Velocity (ii) Material of work piece (iii) Depth of cut (iv) Tool Geometry.	[16M]
3	a)	Discuss the constructional features of speed gear box.	[8M]
	b)	Explain briefly the following operations with neat sketches: (i) Knurling (ii) Forming.	[8M]
4	a)	Calculate the power required to drill 25mm diameter hole in Al plate at a feed of 0.2mm/rev and at a drill speed 400 rpm. Determine also the volume of metal removed per unit energies.	[8M]
	b)	Explain briefly a Jig boring machine with a neat sketch.	[8M]
5	a)	Describe schematic diagram of universal milling machine.	[8M]
	b)	Determine the indexing crank movement for milling square bolt by simple indexing.	[8M]
6	a)	Explain the process of precision grinding with a neat sketch.	[8M]
	b)	What are the various methods of centreless grinding? Explain.	[8M]
7		Explain briefly the following fixtures: (a) Grinding fixtures, (b) Milling fixtures, (c) Indexing fixtures	[16M]

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Code No: RT31032 **R13** SET - 3

III B. Tech I Semester Regular Examinations, November - 2015
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**

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PART –A

1	a)	Discuss the methods of chip control.	[4M]
	b)	What are the advantages of using a taper turning attachment?	[3M]
	c)	How is metal removal rate in a shaping machine calculated?	[3M]
	d)	Define the terms 'Indexing' and 'Dividing head'.	[4M]
	e)	What is the difference between pull broaching and push broaching? Explain.	[4M]
	f)	What are the differences between Jigs and Fixtures? Explain.	[4M]

PART -B

2	a)	Explain the various types of chips.	[8M]
	b)	Draw Merchants force diagram. State the assumptions made in the development of such a diagram.	[8M]
3	a)	Explain briefly the following lathe accessories: (i) Driving Plate (ii) Lathe Centres.	[8M]
	b)	Explain the different types of tool post with neat sketches.	[8M]
4	a)	Calculate the machining time required for machining a surface 600mm x 800 mm on a shaping machine. Assume cutting speed as 8m/min. The return to cutting time ratio is 1:4 and feed is 2mm/double stroke. The clearance at each end is 70mm.	[8M]
	b)	Explain briefly "Twist drill nomenclature" with neat sketches.	[8M]
5	a)	Discuss the differential indexing method with a neat sketch.	[8M]
	b)	Explain briefly the following with neat sketches: (i) Form milling (ii) Gang milling.	[8M]
6	a)	Differentiate between transverse and plunge grinding.	[8M]
	b)	Describe the working principle of surface grinding.	[8M]
7		Explain briefly the following types of Jigs: (i) Universal Jig (ii) Diameter Jig (iii) Channel Jig.	[16M]

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Code No: RT31032 **R13** SET - 4

III B. Tech I Semester Regular Examinations, November - 2015
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**

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PART –A

1	a)	How does the rake angle affect the life of the cutting tool?	[4M]
	b)	Discuss briefly an 'Automatic cut-off machine'.	[3M]
	c)	Discuss the working principle and operation of a shaper.	[4M]
	d)	Explain Face milling with a neat sketch.	[4M]
	e)	What is form grinding? Explain.	[3M]
	f)	What are the types of motion controls in CNC machines? Explain.	[4M]

PART -B

2	a)	In an orthogonal cutting experiment with a tool of rake angle $\alpha=7^0$, the chip thickness was found to be 2.5mm when the uncut chip thickness was set to 1mm. (i) Find the shear angle, β (ii) Find the friction angle γ assuming that merchant's formula holds good	[8M]
	b)	A carbide-cutting tool lasted for 150 min while machining M.S at 35 m/min. If a similar tool is used at 30% higher speed to machine M.S. Calculate the tool life. Also calculate the value of cutting speed if the tool is to machine for 2 hours. Assume n=0.3 in Taylors tool life equation $VT^n = C$.	[8M]
3	a)	A shaft 500mm long has a taper of 100mm/m for a distance of 200mm from one end. The maximum diameter of the shaft is 150mm. Determine the amount of set over required.	[8M]
	b)	Calculate the gears for cutting metric threads of the following pitches: (i) 4mm pitch (ii) 5.25mm pitch. The lead screw of the lathe contains 6TPI. The lathe supplied with 20 to 120 teeth in steps of 5 and an additional gear wheel of having 127 teeth.	[8M]
4	a)	A 40mm HSS drill is used to drill a hole in C.I block 80mm thick. Determine the time required to drill the hole if feed is 0.2mm/rev. Assume an over travel of drill as 5mm. The cutting speed is 22m/min.	[8M]
	b)	Draw the block diagram of a slotting machine and explain briefly its principal parts.	[8M]
5	a)	What are the types of cutters? Explain.	[8M]
	b)	Draw the block diagram of a horizontal milling machine and explain briefly its various parts.	[8M]
6	a)	Explain with a neat sketch "Centreless internal grinding".	[8M]
	b)	What is an abrasive? Explain briefly the following abrasives: (i) Silicon Carbide (ii) Aluminium Oxide.	[8M]
7		Explain briefly the following locating devices: (i) Cylindrical locators (ii) Conical locators (iii) Diamond pin locators.	[16M]

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