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

III B. Tech I Semester Regular/Supplementary Examinations, March – 2021

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**

~~~~~~

PART –A (14 Marks)

1. a) What assumptions are made in Merchant's theory? [2M]
   b) What do you mean by 'Lathe Accessories'? [2M]
   c) Discuss the working principle and operation of a shaper. [2M]
   d) Define the terms 'Indexing' and 'Dividing head'. [3M]
   e) Write any two advantages and limitations of broaching. [3M]
   f) Describe briefly "Principle of Location". [2M]

PART –B (56 Marks)

2. a) What are the factors influencing in selection of cutting speeds and feeds for machining operation? [7M]
   b) In an orthogonal turning of a mild steel bar on a lathe the following data were available: Diameter of work piece = 60 mm; cutting speed = 100 m/min, back rake angle = 14^0; Feed rate=0.25 mm/rev.; Cutting force = 150 kg; Feed force =50 kg; chip thickness =0.4 mm. Calculate shear angle, coefficient of friction, cutting power chip flow velocity and shear force. [7M]

3. a) Explain any two tool holding devices in lathe machine. [7M]
   b) What is the effect of cutting speed, depth of cut and feed rate on the force on cutting tool? [7M]

4. a) Explain with neat sketch the construction and working principle of radial drilling machine. [7M]
   b) Describe the construction and working of jig boring machine. [7M]

5. a) Classify various milling operations that can be performed on a milling machine. [7M]
   b) Explain briefly with neat sketches: [7M]
   (i) Planetary milling machines, (ii) knee-column milling machines.

6. a) Compare honing, lapping and buffing operations. [7M]
   b) What are the various factors to be considered in selection of a grinding wheel? Discuss each in detail. [7M]

7. a) What are the main differences between the jigs and fixture? [7M]
   b) Explain the various types of CNC machines in detail. [7M]

*****
~~~~~~

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

III B. Tech I Semester Regular/Supplementary Examinations, March – 2021

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**

~~~~~~

PART –A (14 Marks)

1. a) What is the cause of built up edge? [2M]
   b) How do you specify a lathe? Explain. [2M]
   c) Find the time required for drilling an 18 mm hole in work piece having thickness of 50 mm. Assume cutting speed 12 m/min and feed 0.2 mm/revolution. Neglect the length of approach. [2M]
   d) List out the merits of indexing method on milling machine. [3M]
   e) Differentiate between Honing and Buffing. [3M]
   f) What do you mean by 3-2-1 location principle? [2M]

PART –B (56 Marks)

2. a) During an orthogonal cutting a chip length of 160 mm was obtained from an uncut chip length of 350 mm. The cutting tool has 22^0 rake angles and a depth of cut of 0.8 mm. Determine the shear plane angle and chip thickness. [7M]
   b) Define various tool angles used in single point cutting tool with neat sketch. [7M]

3. a) Explain any three methods of taper turning on a lathe. [7M]
   b) Explain briefly the following lathe accessories: [7M]
      i) Driving Plate ii) Lathe Centers.

4. a) State the advantages, limitations and applications of a slotter machine. [7M]
   b) Differentiate between counter boring, counter sinking and spot facing. [7M]

5. a) What machining operations can be done on a milling machine? Explain them. [7M]
   b) Draw the block diagram of a horizontal milling machine and explain briefly its various parts. [7M]

6. a) Discuss the effect of abrasive, grain size, grade, structure and bonding on the performance of a grinding wheel. [7M]
   b) Explain the operations performed by a broaching machine. [7M]

7. a) Explain the constructional features of a CNC machine. [7M]
   b) Discuss the following jigs with a neat sketch: [7M]
      i) Template Jig and ii) Leaf Jig.

*****
~~~~~~

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

III B. Tech I Semester Regular/Supplementary Examinations, March – 2021

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**

~~~~~~

PART –A (14 Marks)

1. a) Name the factors that contribute to the formation of segmental chips. [2M]
   b) What are the functions of the saddle on a lathe? [2M]
   c) Mention the operation performed by planer. [2M]
   d) Why is milling a versatile machining process? [3M]
   e) Differentiate between grit and grade of a grinding wheel. [3M]
   f) Give the classification of jigs. [2M]

PART –B (56 Marks)

2. a) Draw a neat sketch of a single point cutting tool indicating its complete geometry on it. [7M]
   b) The lives of two cutting tools governed by equation $VT^{0.125} = 2.5$ and $VT^{0.25} = 7$ respectively in certain machining operation, where V is cutting speed in m/s and T is the tool life in seconds. Find out the speed at which both tools have the same tool life. Also calculate the corresponding tool life. [7M]

3. a) Explain the various types of chucks in detail. [7M]
   b) Explain the principle of operation of a Multi-spindle progressive action type horizontal automatic machine. [7M]

4. a) How will you adjust the length of stroke and ram position in shaper? [7M]
   b) Explain with neat sketch the construction and working principle of radial drilling machine. [7M]

5. a) Draw a neat sketch of universal dividing head and explain its working. [7M]
   b) What are the various types of indexing methods? Explain with examples. [7M]

6. a) What are the various factors to be considered in selection of a grinding wheel? Discuss each in detail. [7M]
   b) What is the difference between lapping and honing? Explain. [7M]

7. a) Explain the principle of six point location. [7M]
   b) Describe the main features of CNC machines, which distinguish them from conventional machine tools. [7M]

*****
~~~~~~

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

III B. Tech I Semester Regular/Supplementary Examinations, March – 2021

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**

~~~~~~

PART –A (14 Marks)

1. a) What are the factors responsible for built-up edge in cutting tools? [2M]
   b) What are the advantages of using a taper turning attachment? [2M]
   c) What are the differences between a planer and a shaper? [2M]
   d) Differentiate between up milling and down milling. [3M]
   e) Write the advantages of broaching. [3M]
   f) What is the purpose of clamping? [2M]

PART –B (56 Marks)

2. a) Explain why studying the types of chips produced are important in understanding metal cutting operation. [7M]
   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 $VT^n = C$. [7M]

3. a) Name the different methods of taper turning done on a centre lathe and explain any two methods with neat sketch. [7M]
   b) Draw a tool layout for production of hexagonal button using capstan lathe. [7M]

4. a) Explain with the help of neat sketch open belt and cross belt drive mechanism used in planer machine. [7M]
   b) How do you carry deep hole drilling? Discuss in detail. [7M]

5. a) With the help of a simple diagram explain the role of each element of milling cutter. [7M]
   b) Explain briefly the following with neat sketches: [7M]
      i) Straddle milling ii) Dove-tail milling.

6. a) Explain the working principle of surface grinding. [7M]
   b) Describe the continuous broaching machines. [7M]

7. a) Explain any one milling fixture with a neat sketch. [7M]
   b) Describe the following tool positioning systems: [7M]
      i) Point to point system ii) Straight line system.

*****
~~~~~~