

Question One (10 Marks):

Choose the correct answer:

- 1- Completing the part geometry is the process.
a- cutting. b- roughing. c- finishing.
- 2- lathe, is a lathe machine which have multiple tool mounted.
a- Automatic. b- Turret. c- Engine.
- 3- Increase shear plane angle coefficient of friction.
a- increase b- reduce c- not affect
- 4- is preferred because it leads to the longest possible use of the tool.
a- Fracture failure. b- Temperature failure. c- Gradual wear.
- 5- The chuck used for eccentric turning operation.
a- 4-jaws. b- 3-jaws. c- both.
- 6- Chip breaker features on inserts for the purpose of vibration.
a- reducing. b- increasing. c- keeping.
- 7- used to check the dimension at its maximum material condition.
a- GO limit. b- NO-GO limit. c- both.
- 8- is used to gagging of hole diameter.
a- Snap gage. b- Plug gage. c- Block gage.
- 9- The insert can be attached to cutting tool by
a- brazing. b- mechanical clamp. c- both.
- 10- is considered as the hardest material used in cutting tool fabrication.
a- Diamond. b- HSS. c- Cermets.

Question Two (15 Marks):

- a- Explain the difference between roughing and finishing operations in machining.
- b- In an orthogonal cutting operation, the rake angle = -5° , chip thickness before the cut = 0.2 mm and width of cut = 4.0 mm. The chip ratio = 0.4. Determine (I) the chip thickness after the cut, (II) shear angle, (III) friction angle, (IV) coefficient of friction, and (V) shear strain.
- c- A cylindrical workpiece 200 mm in diameter and 700 mm long is to be turned in an engine lathe. Cutting speed = 2.30 m/s, feed = 0.32 mm/rev, and depth of cut = 1.80 mm. Determine (1) cutting time, (2) metal removal rate.

Question Three (15 Marks):

- a- Name the various methods of holding the workpiece in a lathe.
- b- Name the advantages and limitations of machining processes.
- c- A drilling operation is to be performed with a 10.5 mm diameter twist drill in a plastic workpiece. The hole is a through hole at a depth of 40 mm and the point angle is 60° . The cutting speed is 20 m/min and the feed is 0.25 mm/rev. Determine (1) the cutting time to complete the drilling operation, (2) metal removal rate during the operation.

Question Four (15 Marks):

- a- A machining operation is being carried out with a cutting fluid that is an effective lubricant. What will be the changes in the mechanics of the cutting operation if the fluid is shut off?
- b- With the aid of sketches, name four operation can be performed in milling machine
- c- The shear strength of a certain work material = 50,000 lb/in². An orthogonal cutting operation is performed using a tool with a rake angle = 20° at the following cutting conditions: cutting speed = 100 ft/min, chip thickness before the cut = 0.015 in, and width of cut = 0.150 in. The resulting chip thickness ratio = 0.50. Determine (I) the shear plane angle, (II) shear force, (III) cutting force and thrust force, and (IV) friction force.

Question Five (15 Marks):

- a- Why surface is important?
- b- In a measurement of surface roughness parameters, heights of 20 successive peaks and valleys were measured with a skid less stylus and were 35, 22, 36, 28, 42, 22, 32, 23, 36, 18, 21, 36, 25, 41, 22, 37, 18, 36, 21, 30 microns. If the measurements were obtained over a sampling length of 0.8 mm, determine the average roughness (R_a).
- c- Tool life tests in turning yield the following data: (I) when cutting speed is 120 m/min, tool life is 7 min; (II) when cutting speed is 80 m/min, tool life is 28 min. (1) Determine the n and C values in the Taylor tool life equation. Based on your equation, compute (2) the tool life for a speed of 100 m/min, and (3) the speed corresponding to a tool life of 10 min.