

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Regular & Backlog), November 2016

B. Tech in Mechanical Engineering, Semester V

Roll No.....

ME 508: Machining, Machine tools & Metrology

Time: 3 hours

Max. Marks: 100

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.

Q.1A Objective type multiple choice questions (10 questions @ 1 mark)

10

- i. Which one of the following methods should be used for turning internal taper only?
a) Taper attachment b) Tailstock offset c) form tool d) Compound rest
- ii. What is the process of removing metal by a milling cutter which is rotated against the direction of travel of the work piece, called?
a) Down milling b) End milling c) Up milling d) Face milling
- iii. Carbide tool is used to machine a 30 mm diameter steel shaft at a spindle speed of 1000 revolutions per minute. The cutting speed of the above turning operation is :
a) 1000 rpm b) 1570 m/min c) 94.2 m/min d) 47.1 m/min
- iv. Which of the following are the advantages of a hydraulic shaper over a mechanically driven shaper
 1. more strokes per minute can be obtained at a given cutting speed
 2. the cutting stroke has a definite stopping point
 3. it is simpler in construction
 4. Cutting speed is constant throughout most of the cutting stroke

Select the correct answer using the codes given below.

- a) 1 and 2 b) 2 and 4 c) 1 and 4 d) 1, 3 and 4

- v. The tool signature is specified for a single-point cutting tool in American system is as
10, 12, 8, 6, 15, 20, 3

What does the angle 12 represent?

- a) Side cutting-edge angle b) Side clearance angle
c) Back rake angle d) Side rake angle

- vi. If α is the rake angle of the cutting tool, ϕ is the shear angle and V is the cutting velocity, then the velocity of Chip sliding along the shear plane is given by

- a) $\frac{V \cos \phi}{\cos(\phi - \alpha)}$ b) $\frac{V \sin \phi}{\cos(\phi - \alpha)}$ c) $\frac{V \cos \phi}{\sin(\phi - \alpha)}$ d) $\frac{V \sin \phi}{\sin(\phi - \alpha)}$

- vii. If the diameter of the hole is subject to considerable variation, then for locating in jigs and fixtures, the pressure type of locator used is

- a) conical locator b) cylindrical locator c) Diamond pin locator d) Vee locator

- viii. A carbide tool (having $n=0.25$) with a mild steel workpiece was found to give life of 1 hour 21 minutes while cutting at 60 m/min. The value of C in Taylor's tool life equation $VT^n = C$ would be equal to

- a) 200 b) 180 c) 150 d) 100

- ix. Match List-I (measuring Device) with List-II (Parameter measured) and select the correct answer using the codes given below the lists:

List-I

- A) Diffraction grating
B) Optical flat
C) Auto collimators
D) Laser scan micrometer

List-II

1. small angular deviation on long flat surfaces
2. online measurement of moving parts
3. measurement of gear pitch
4. measurement of very small displacements

- a) A-4, B-2, C-1, D-3 b) A-4 B-3, C-1, D-2 c) A-3, B-4, C-1, D-2 d) A-3, B-4, C-1, D-2

- x The M and E- system in metrology are related to measurement of
a) Screw threads b) Flatness c) Angularity d) Surface finish

Q.1B	Short answer type questions (4 questions @ 2.5 marks)	10
i.	What are the general requirements of any machine tool	
ii.	What is the drilling time for producing a hole in MS sheet of 25 mm thickness using an HSS drill of 20 mm diameter? The cutting speed and feed for drilling are 20 m/min and 0.25 mm/revolution respectively. Neglect time taken for setting up, approaching and travelling of tools.	
iii.	With neat sketches, explain flank wear and crater wear	
iv.	Explain briefly the functionality of a Fixture to be an effective production device.	
Q.2A	With a neat sketch explain working principle of translatory hydraulic drive machine (hydraulic shaper mechanism).	05
Q.2B	Describe with neat sketches: commonly used bed sections and wall arrangements with their applications	05
Q.3A	Describe the single point cutting tool geometry in machine reference (ASA) system	05
Q.3B	With a neat sketch describe the essential elements of the broach and also state the advantages of Broaching process.	05
Q.4A	Sketch and explain the nomenclature of a twist drill	05
Q.4B	Differentiate between Up milling and Down milling	05
Q.5A	Explain the importance of jigs and fixtures in production line.	05
Q.5B	Explain the various cutting and noncutting press tools operations.	05
OR		
Q.5B	What is mean by press tools? And explain the types of press tools.	05
Q.6A	Write a brief note on the functioning of screw gauge and auto-collimator.	04
Q.6B	Explain with neat sketch, the construction and working principle of LVDT.	06
OR		
Q.6B	Draw a neat sketch of a toolmakers microscope and explain briefly the construction.	06
Q.7A	Explain the following operations, with simple sketches i) Reaming ii) Boring iii) Counterboring	06
Q.7B	Compare shaper and planer in terms of their operation, type of work piece and applications	4
Q.8A	Give in detail assumptions made while deriving cutting forces using Merchant's circle diagram.	4
Q.8B	Derive an expression for the shear angle in orthogonal cutting, in terms of rake angle and chip thickness ration.	6
Q.9A	A cast iron bar stock was turned at 50 m/min, for which the tool life was 3 hours. For the same material, at 40 m/min, the tool life was 5 hours. Find the value of constant C & n in the Taylor's tool life equation and also state the type of tool material based on the value n.	6
Q.9B	Estimate the force and thrust for a 20 mm drill with a feed of 0.2 mm/rev rotating at 150 rev/min, while drilling mild steel.	4