

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY-2008****III B.TECH SUPPLEMENTARY EXAMINATIONS  
MACHINE TOOLS AND METROLOGY  
(AUTOMOBILE ENGINEERING)**

AUG/SEP -2008

TIME-3 HOUR  
MARK-80**ANSWER ANY FIVE QUESTIONS. ALL QUESTIONS CARRY EQUAL MARKS.**

1. (a) Which are two popular metal cutting theories? Describe them.  
(b) With suitable diagram, derive expression for finding shear velocity and chip flow velocity if cutting velocity, shear angle and rake angle are known.
2. (a) Explain briefly about thread cutting methods.  
(b) Why back gear is used in lathe? Describe in detail the method of using them.
3. (a) Explain the working of a hydraulic quick return mechanism of a shaper.  
(b) Sketch and describe the working of automatic table feed mechanism of shaper
4. Write a brief note on the following
  - (a) Super finishing
  - (b) Cylindrical super finishing
  - (c) Flat and Spherical super finishing
  - (d) Polishing
5. (a) Explain the terms: Basic size; Zero line; lower and upper deviations. Draw a conventional diagram to represent these terms for a shaft and hole pair of interference fit.  
(b) The hole and shaft assembly of 30mm nominal size have tolerances specified as  $30+0.02 -0.000$ mm for hole and  $30-0.04 -0.07$ mm for shaft. Determine
  - i. Maximum and minimum clearance (interference) attainable
  - ii. Allowance
  - iii. Hole and shaft tolerances
  - iv. Fundamental deviation
  - v. MML for shaft and hole
  - vi. Type of fit.Sketch these values on a conventional diagram.
6. Explicate the use of
  - (a) angle gauges
  - (b) sine bars for measurement of angles
7. Elucidate the working principles of
  - (a) Autocollimator
  - (b) Optical projector
  - (c) Straight edge
8. (a) Enumerate the basic differences between electrical and mechanical comparators.  
(b) Explicate the working principle of
  - i. electronic comparator
  - ii. pneumatic comparator