

Manufacturing Technology (ME – 604)

Full marks: 70

Time: 3 hour

*Attempt any five questions
All questions carry equal marks*

1. (a) Write down the differences between plain and universal column and knee type milling machines.
(b) Draw a neat sketch of the basic interface between tool and job in peripheral milling operation. With the help of this diagram express all the cutting parameters.
(c) With the help of diagram explain the differences between the two basic types (up and down) of milling.
2. (a) What are the different types of milling operations with respect to the use of cutter? Elaborate the differences between them with neat sketches.
(b) With neat sketches show the axial and radial rake angles as well as the axial and radial relief angles of face and end milling cutters.
(c) Show that in face milling operation the machining time depends on the width of the job, diameter and number of teeth of the cutter, apart from the cutting parameters.
3. (a) What are the main differences between broaching and other basic machining operations?
(b) With a neat sketch and proper labeling show the basic shape and nomenclature of a conventional pull (hole) broach.
(c) Discuss about broach materials with the reasons for selecting them.
4. (a) State the distinguishing characteristics of grinding over conventional machining.
(b) Name the different types of abrasives and bond materials used in grinding wheel. State their characteristics and applications.
(c) How abrasive grain size influences the stock removal rate and the generated surface finish?
5. (a) What is meant by the terms 'grade' and 'structure' of a grinding wheel?
(b) Explain how operating conditions influences grinding operation?
(c) Draw the standard shapes of grinding wheels that are commonly used.
6. (a) Why specific energy requirement is much higher in grinding than in conventional machining?
(b) Estimate the average uncut chip thickness for surface grinding (reciprocating mode) a mild steel plate by an alumina wheel of diameter 150 mm under the following conditions:
 - (i) No of active grits per unit length along the wheel periphery = 20/cm
 - (ii) Grinding velocity = 50 m/s
 - (iii) Work-table feed rate = 2 m/min
 - (iv) Depth of infeed = 40 μ m
(c) Why grinding wheel needs balancing, truing and dressing before use? How grinding wheels are dressed before use?

7. (a) How grinding machines are classified based on surface generated.
- (b) With neat sketches explain the working principles of centreless internal cylindrical grinding.
- (c) Compare creep feed grinding and high-efficiency deep grinding with the conventional grinding with regard to ranges of the grinding parameters.
8. Write short notes on any four:
- (i) Rake angle of drill bit (ii) Marking system for grinding wheels, (iii) Safety precautions in grinding, (iv) Honing operation (v) Advantages and disadvantages of broaching.