



- (b) (i) In an orthogonal cutting test with a tool of rake angle  $10^\circ$  the following observations were made :

Chip thickness ratio = 0.3;

Horizontal component of the cutting force = 1290 N

Vertical component of the cutting force = 1650 N. From the Merchant's theory, calculate the various components of the cutting forces and the coefficient of friction at the chip tool interface. (8)

- (ii) What are the functions of a cutting fluid? Explain in detail, the guidelines adopted for the selection of cutting fluid based on material and tool characteristics. (8)

12. (a) (i) Enumerate the various methods of producing taper. (12)  
(ii) Explain the purpose of centres used in lathe. (4)

Or

- (b) Briefly explain with a neat sketch, the types of work holding devices that are commonly employed in automatic lathe. Also specify its limitations.

13. (a) (i) Explain with a neat sketch, the quick return motion mechanism of a shaper. (12)  
(ii) How the stroke length and position of the ram is adjusted? (4)

Or

- (b) Explain the following with a neat sketch :

- (i) Gear Generation Process. (8)  
(ii) Gear Finishing Process. (8)

14. (a) (i) Describe the terms dressing and truing of Grinding Wheels. (8)  
(ii) Explain, how a wheel is balanced and mounted? (8)

Or

- (b) Describe the construction and operation of a vertical broaching machine with a neat sketch. Also sketch a broach tool with nomenclature.

15. (a) (i) Explain the advantages and limitations of NC machines. (8)  
(ii) Describe four main features of CNC machines, which distinguish them from conventional machine tools. (8)

Or

- (b) Explain the various types of statements used in APT language, with suitable examples.