(3 Hours) [Total Marks : 100

N.B. : (1) Question No. 1 is **compulsory**.

(2) Attempt any **four** questions from **remaining** questions.

(3) **Figures** to the **right** indicate **full** marks.

(4) Missing data may be **suitably** assumed.

1. Answer in brief any **four** :– 20

(a) What is the six point location principle ?

(b) Discuss the assumptions made in merchants circle diagram.

(c) Rolling defects.

(d) Types of coolants.

(e) Worm working.

2. (a) What error is caused by the improper orientation of a V location ? 7

(b) Sketch the various types of jig feet. 6

(c) How can a lathe fixture be clamped to the lathe ? 7

3. (a) An othogonal cutting of steel is done with $10°$ yake tool, with depth of cut 2 mm 10
and feed rate of 0·20 mm/rev. The cutting speed is 200 m/min. The chip thickness
ratio is 0·31. The vertical cutting force is 1200 N and horizontal cutting force
is 650 N. Calculate from the Merchant's theory, the various work done in metal
cutting and shear stress.

(b) How is metal removed in metal cutting ? Explain the process by giving any simple 10
model to explain the metal removal process.

4. (a) A 600 mm long job of diameter 150 mm of AISI 4140 steel is to be turned with 15
a depth of cut of 1·5 mm and feed rate 0·25 mm/rev. The following data is
applicable for the problem –

Labour cost per hour = ₹ 12.00

Machine overhead per hour = ₹ 40.00

Grinding cost per hour = ₹ 15.00

Grinding machine overhead per hour = ₹ 50.00

Idle time = 5 minutes

Taylor's tool life equation is given by

$VT^{0.22} = 475$

[TURN OVER

The operation can be carried out using tungston carbide tools either as brazed tools or throwaway tools.

For brazed tools,

Initial cost	= ₹ 60
Grinding time	= ₹ 5 minutes / edge
Tool changing time	= ₹ 2 minutes
9, Grinding per tool before salvage	

For throw away tips,

Initial cost	= ₹ 40
Tool change time	= 1·5 minutes
Total cutting edges	= 8.

Find the optimum cutting speed, tool life and the cost of the operation for both the brazed tip and throwaway types using the criteria of minimum production cost, and maximum production rate.

(b) Explain with neat sketch any one type of lathe tool dynamometer.   5

5. (a) Explain the stapes for designing a formtool.   6
(b) Write with neat sketch stapes of Designing broach tool.   9
(c) Write a note on cutting fluids.   5

6. (a) A cup of 105 mm inside diameter and 90 mm deep is to be drown form steel   10
sheet 1 mm thick. Determine the blank diameter and a suitable punch diameter for the first drow. Give the probable dimensions of the cup obtained form the first drow and estimate the press capacity.
(b) Sketch a sectioned view of blanking die and lable on it. Clearance, straigut and   10
angular clearance.

7. (a) Sketch and explain : different types of rolling mills.   10
(b) Write short notes on :–   10
   (i) Extrusion
   (ii) Rotary swaging.

****