Te/sem VIS/prod/CBGS/10/ctool design/27-12-16
machine Tool Design Q.P. Code: 60920

Q.P. Code: 609204

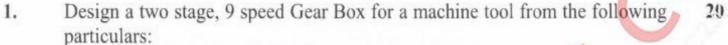
(3 Hours)

[Total Marks: 80]



Motor speed

- (2)Attempt any **THREE** questions from the **remaining**.
- Use of PSG Design Data Book is **permitted**. (3)
- (4) Make appropriate assumptions, wherever necessary.
- (5) Illustrate your answers with **neat** sketches.



Minimum output speed = 150 rpmMaximum output speed = 1000 rpm= 10HPInput motor power

Design the shaft sizes, arrangement of gears and their sizes. Also draw the structural diagram, optimum ray diagram and deviation diagram. Prepare a neat sketch depicting the layout of the gear box with relevant details.

= 1400 rpm.

- (a) Explain with sketches various methods of elimination of backlash in 2. 05 15 power screws.
 - (b) Design a lead screw and nut for a lathe to sustain an axial load of 8 kN. The lead screw is to be 3 m long and is to rotate at 100 rpm. The coefficient of friction at the collar and threads could be taken as 0.12 and 0.14 respectively.
- 3. (a) Discuss the various wear compensation techniques used in slideways. 05
 - (b) Design and sketch a multi-plate clutch used in a metal cutting machine tool with a power transmitting capacity of 8kW at 1000 rpm. The clutch is to be operated 80 to 100 times in an 8 hour shift. The design should include the discs and the operating lever. Assume appropriate data from hand book, clearly specifying the same.
- 4. (a) Explain in brief the slideway profiles stating its advantages and 05 disadvantages
 - (b) A full journal bearing is to be designed to support a load of 5 kN. The shaft is to operate at a speed of 1000 rpm. The spindle transmits 8 HP. It is desired to operate the bearing at a surface temperature not exceeding 60°C in a room temperature of 32 °C.
 - Determine: 04
 - 03 1. Length, diameter and clearance of the bearing. Oil viscosity and coefficient of friction. 04
 - 3. Power loss in overcoming friction at the bearing.
 - 4. Quantity of oil required to be circulated to maintain the bearing surface temperature.

(TURN OVER)

15

04

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20

- (a) Discuss the different bearing materials and their characteristics.
 (b) A deep groove ball bearing with dynamic capacity of 35kN is loaded as
 - (b) A deep groove ball bearing with dynamic capacity of 35kN is loaded as shown:

Axial (N)	Load	Radial Loa (N)	d rpm	%cycle time
2000		4000	1000	25
1000		2800	1200	35
1800		4200	1400	40

Determine: Cubic mean load, 90% life of bearing in hours, Average life of bearing in hours.

- 6. Write explanatory notes on any four of the following:-
 - (a) Enumerate the various characteristics of a machine tool.
 - (b) Types of belts and materials of construction.
 - (c) PIV drives.
 - (d) Norton gear box.
 - (e) Different safety devices incorporated in machine tools.
