

22570

24225

3 Hours / 70 Marks

Seat No.

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- Instructions :**
- (1) All Questions are *compulsory*.
 - (2) Illustrate your answers with neat sketches wherever necessary.
 - (3) Figures to the right indicate full marks.
 - (4) Assume suitable data, if necessary.

Marks

1. Attempt any FIVE of the following :

10

- (a) List any two examples of Machine tools.
- (b) State the reason of locating bearing as near as possible to Spindle nose.
- (c) Define the term 'Service factor'.
- (d) State the basic functions of guide ways.
- (e) List the standered values of Geometric progression ratios (ϕ).
- (f) Define the term Ergonomics in Machine tool Design.
- (g) State any two applications of Morse Taper Spindle.

2. Attempt any THREE of the following :

12

- (a) State the various methods of reducing stress concentration and also explain any of them.
- (b) Explain the reason of preferring steel machine structure over Duraluminium machine structure.
- (c) Explain any four aspects of Aesthetics in Machine tool design.



- (d) State the advantages of using Geometrical progression in Machine tool drive in respect to
 - (i) Cutting speed
 - (ii) Productivity

3. Attempt any THREE of the following : 12

- (a) State any four positive features of Aerostatic Slideways.
- (b) State the requirements of Spindle units.
- (c) Explain stick-slip vibration in Machine Tool.
- (d) Describe any four requirements of Machine tool structure.

4. Attempt any THREE of the following : 12

- (a) Differentiate between Group-1 and Group-2 Machine Structure.
- (b) Explain with neat sketch working principle of sliding journal bearing.
- (c) Differentiate between Qualitative and Quantitative Display.
- (d) List the various materials used for manufacturing machine tool and also write their properties.
- (e) Draw any four profiles of machine tool structure.

5. Attempt any TWO of the following : 12

- (a) Explain with neat sketch : (i) V – Slideways (ii) Flat Slideways
- (b) Calculate rpm values (N_x) and diameters (d_x) served by each rpm for minimum speed = 30 rpm, Maximum speed = 375 rpm, Number of steps are 12 and cutting velocity is 20 m/min.
- (c) Draw structural diagrams for given structural formulae :
 - (i) 2(1) 3(2) 2(6)
 - (ii) 2(1) 3(4) 2(2)

6. Attempt any TWO of the following :

12

- State any three methods of improving stiffness of structure and also state advantages of using Box-Type structure.
- List various sources of vibrations in machine tool, also state their causes.
- Answer following questions related to structural diagram in figure 1.1 :

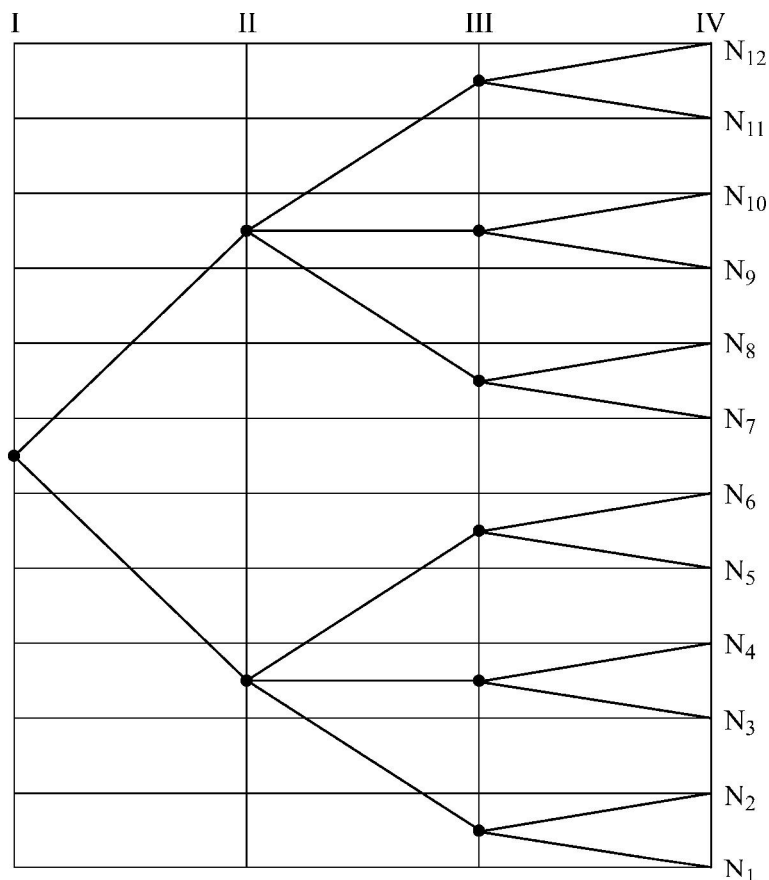


Figure 1.1 → structural diagram for 2(6) 3(2) 2(1)

- Find number of speed steps.
- Number of stages
- Number of shafts
- Value of spacing between adjacent steps in terms of (ϕ) .
- minimum RPM
- maximum RPM

