



17532

21415

3 Hours/100 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**.*
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MARKS

1. A) Attempt **any three** : 12
- a) What are the basic design requirements ?
 - b) Explain stress concentration factor.
 - c) Explain hydrostatic slide ways.
 - d) What are the requirements for layout of a stepped drive ?
- B) Attempt **any one** : 6
- a) Explain selection of range of spindle speed.
 - b) Explain stickslip motion in guides.
2. Attempt **any four** : 16
- a) State general design procedure.
 - b) What are the factors affecting stiffness of machine tool structure ?
 - c) State the different types of bearings used for spindle units.
 - d) State advantages of G. P. series.
 - e) What are the sources of machine tool vibrations ?
3. Attempt **any two** : 16
- a) Explain decision making for the best ray diagram of a Gear box.
 - b) Explain the function of guide ways. State the requirements for selecting materials for guide ways.
 - c) State the general requirements of machine tool design.

P.T.O.



4. A) Attempt **any three** : 12
- a) Explain aerostatic slide ways.
 - b) Why feasibility of structural formula is required ? How it is checked ?
 - c) Explain the method of reducing vibrations.
 - d) What is the function of push button, knobs levers and cranks ?
- B) Attempt **any one** : 6
- a) Explain types of surface profiles produced by machine tools.
 - b) Explain factor of safety and service factor.
5. Attempt **any four** : 16
- a) State different types of materials required for machine tool structures. State its applications.
 - b) What are the functions of machine tool structures ?
 - c) Calculate spindle speeds for the following :
Given $\phi = 1.2$, $N_1 = 36$ rpm and no. of steps six. Also draw suitable structure diagram for six speed and ray diagram for the same.
 - d) List out the different sources of vibrations in machine tools ?
 - e) Define Aesthetics. Why is it important ?
 - f) State any four effects of vibration on workpiece.
6. Attempt **any four** : 16
- a) What are different requirements of machine tool structures ?
 - b) What is the functions of spindle units ? What is its requirements ?
 - c) What are the different constraints for stepped regulation of speed ?
 - d) What is natural frequency of vibration ?
 - e) State ergonomic considerations applied to types and location of display.
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