



17532

16172

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.*
 - (5) *Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.*

Marks

1. A) Attempt any three :

- a) What are working and auxiliary motions in machine tools ? Give any two examples of working motion. **4**
- b) Explain the factors affecting stiffness of machine tool structure and methods of improving it. **4**
- c) State the functions of guideways. **4**
- d) Explain the classification of machine tools. **4**

B) Attempt any one :

- a) Explain with block diagram general design procedure for machine element. **6**
- b) State the functions and requirements of machine tool structures. **6**

2. Attempt any four :

- a) Explain with neat block diagram engineering design process applied to machine tools. **4**
- b) State requirements of machine tool spindle. **4**
- c) What is the structural diagram ? Explain how best ray diagram analyse. **4**
- d) State the requirements of layout of stepped drive. **4**
- e) Explain with neat sketch ergonomic in design of following control members (i) knobs (ii) hand wheel. **4**

3. Attempt any two :

- a) State the different materials used for machine tool structures. Write their properties. What are different shapes in which they are used ? State one example of each one. **8**
- b) What are the different types of spindle support ? Explain different types of bearings used for spindle units. **8**
- c) What are the types of vibrations ? List out the different sources of vibrations in machine tools. **8**

P.T.O.

4. A) Attempt **any three** :

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|---|---|
| a) Differentiate between sideways and guideways. | 4 |
| b) What are the various laws of stepped regulation ? Describe arithmetic progression and geometric progression. | 4 |
| c) State the different constraints for stepped regulation of speed. | 4 |
| d) Explain man-machine relationship in ergonomics. | 4 |

B) Attempt **any one** :

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|--|---|
| a) Explain with neat sketches different shapes of slideways. | 6 |
| b) Write the structural formulae. In a two stage feed box having no. of steps eight. Draw structural diagrams check feasibility. | 6 |

5. Attempt **any four** :

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|---|---|
| a) Explain the importance of Aesthetics in design of machine tools. | 4 |
| b) Discuss in brief how vibrations in machine tools can be eliminated. | 4 |
| c) Define speed chart. Explain difference between structural diagram and speed chart. | 4 |
| d) Explain the selection of range ratio in design of stepped drive. | 4 |
| e) What is stress concentration ? Explain the methods of reduction of stress concentration. | 4 |
| f) Explain stick-slip phenomena. | 4 |

6. Attempt **any four** :

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|--|---|
| a) Calculate the rpm values and diameter range served by each rpm for the following $n_1 = 30$ rpm, $n_z = 375$ rpm $v = 20$ m/min, $z = 12$ for geometric progression. Write comment. | 4 |
| b) Differentiate between hydrostatic and hydrodynamic slideways. | 4 |
| c) Explain ergonomic considerations applied to the location of displays. | 4 |
| d) What are the types of antifriction ways, explain any one. | 4 |
| e) Explain different stiffener arrangements with suitable sketches. | 4 |
