15162

3 Hours / 100 Marks   Seat No.

Instructions : *(1) **All** questions are **compulsory**.*
*(2) Answer **each** next main question on a **new** page.*
*(3) Illustrate your answers with neat sketches **wherever** necessary.*
*(4) Figures to the **right** indicate **full** marks.*
*(5) Assume suitable data, if **necessary**.*
*(6) Use of Non-programmable Electronic Pocket Calculator is **permissible**.*
*(7) Mobile Phone, Pager and any other Electronic Communication devices are **not** permissible in Examination Hall.*

Marks

1. A) Attempt **any three** :   **12**

a) What is factor of safety ? State its importance with respect to machine tool.

b) State any four requirements of machine tool structures.

c) Draw the neat sketch of open and closed type guide way and explain where is it used ?

d) How machine tool is different from cutting tool ? (At least four points of difference each).

1. B) Attempt **any one** :   **6**

a) State atleast four factors considered, while selecting a factor of safety ? State importance of each of them.

b) State the different materials used for machine tool structure ? State their specific advantages and disadvantages.

2. Attempt **any four** :   **16**

a) What is service factor ? Give its significance.

b) List down the different properties of materials used for machine tool spindles.

c) Draw open type and cross type structural diagram for structural formula 2x3x1.

d) What is ray diagram ? Describe significance of ray diagram with sketch.

e) Define aesthetics of a machine tool. State its importance for a machine tool.

3. Attempt **any two** :   **16**

a) State the different profiles used for machine tool structure. Which profile is more preferred for use ? Why ? State any two applications of profile.

b) Draw the block diagram of design process of machine tool and describe it in detail.

c) How vibrations in machine tools can be eliminated or reduced ? Explain the method in brief.

P.T.O.

Marks

4. A) Attempt **any three** :　　　　　　　　　　　　　　　　　　　　　　　　**12**

　　a) Define :

　　　　i) Common ratio

　　　　ii) Range ratio.

　　　State the standard values of each of them.

　　b) Why feasibility of ray diagram is required ? How is it analysed ?

　　c) State and explain in brief factors affecting stiffness of machine tool structure. State in brief remedies thereof .

　　d) State functions of any two knobs with sketch.

　B) Attempt **any one** :　　　　　　　　　　　　　　　　　　　　　　　　　**6**

　　a) Draw neat sketch of any spindle unit. State its functions and also write any two requirements of it.

　　b) Describe stepped regulation used in machine tools. State its basic types.

5. Attempt **any four** :　　　　　　　　　　　　　　　　　　　　　　　　　　**16**

　a) Describe the importance of location of displays by giving suitable example.

　b) List the effects of vibration on workpiece. Any four.

　c) What is speed chart ? Why is it necessary ? Describe with suitable example.

　d) What are the factors on which selection of common ratio depends ?

　e) What are antifriction guideways ? Draw sketch of any one type and describe in brief.

　f) Define stress concentration. State causes of stress concentration.

6. Attempt **any four** :　　　　　　　　　　　　　　　　　　　　　　　　　　**16**

　a) Given N1 = 56 rpm N6 = 860 rpm. Calculate the common ratio ϕ and remaining speeds for six speed gear box.

　b) What are different types of bearings used as spindle support ? Describe in brief.

　c) Explain the term compatibility in design of control members.

　d) State types of guideways used in following :

　　　i) Milling machine table.

　　　ii) Carriage of lathe.

　　　iii) Arm of radial drilling machine.

　　　iv) Compound rest of lathe.

　e) State four advantages of plastic as a material for slideways used in machine tools. Also write two limitations of plastic as a material used in machine tool for slideways.

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