15116

3 Hours / 100 Marks   Seat No.

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) Preferably, write the answers in sequential order.

Marks

1. A) Attempt **any three** :   **(3×4=12)**

     a) Define factor of safety. List the factors governing its selections.

     b) Differentiate between cutting tool and machine tools.

     c) State the different requirement of Machine tool structures.

     d) What is closed and open guide ways ? Draw the sketch of any one type.

   B) Attempt **any one** :   **(1×6=6)**

     i) Define stress concentration factor. State its importance in design.

     ii) List the factors affecting stiffness of machine tool structure. Give the methods to improve it.

2. Attempt **any four** :   **(4×4=16)**

     i) Write general procedure of machine tool design.

     ii) State the types of spindle and its requirement.

     iii) Draw any structure diagram for 1×2×3 and 3×1×2.

     iv) Explain significance of Ray diagrams.

     v) State the importance of ergonomics in machine tool design.

3. Attempt **any two** :   **(2×8=16)**

     a) i) What are the materials used in machine tool structure ? List their properties.

       ii) List the different profile used in machine tool structure. State the example.

     b) Explain with the sketches, the different types of spindle supports.

     c) List out the different sources of vibration in machine tools. State methods to reduced it.

P.T.O.

Marks

4. A) Attempt **any three** : (3×4=12)

    a) What are the factors to be considered ? While selecting materials for machine tool structures.

    b) What is stepless speed drive ? Give two examples.

    c) Draw layout of speed step. Write advantages of G.P. series.

    d) State the meaning of Aesthetic consideration in machine tool. Give its importance.

  B) Attempt **any one** : (1×6=6)

    a) i) Define spindle unit.

      ii) List the function of spindle unit.

      iii) List the two requirement of spindle unit.

    b) Why feasibility of Ray diagram in required ? How feasibility of Ray diagram in checked ?

5. Attempt **any four** : (4×4=16)

  i) Draw sketches of any two knobs used in machine tool. Write its function.

  ii) Explain the concept of natural frequency of vibration.

  iii) Define speed chart. Why it is necessary ?

  iv) Define common ratio. State factors on which selection of common ratio depends.

  v) Draw the neat sketch of Antifriction guide way.

  vi) What is osmostatic slide ways ? State its advantages over conventional guide ways.

6. Attempt **any four** : (4×4=16)

  i) Find the speed steps arranged in geometric progression for the following data. N_{min} = 12 rpm, N_{max} = 510 rpm and speed step Z = 8.

  ii) Explain the ergonomics consideration in design and location of display and control members.

  iii) State different types of bearing used for supporting spindles.

  iv) Suggest suitable guide (Slide ways) ways for following machine tools.

    a) Planning machine   b) Surface grinders

    c) Tail stock of lathes   d) Small vertical drills.

  v) Which type of machine tool structure profile is mostly used in machine tools ? Why ?

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