

**42714****May, 2019****M.Tech. (ME) - I SEMESTER****MACHINE TOOL DESIGN (MME-107)**

Time : 3 Hours]

[Max. Marks : 75

*Instructions :*

1. *It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.*
2. *Answer any four questions from Part-B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*

**PART-A**

1. (a) Write down the principles of machine tool design. (1.5)
- (b) Enlist various requirements of machine tool. (1.5)
- (c) Differentiate between speed and feed. (1.5)
- (d) What are the properties of materials used in machine tool structure? (1.5)
- (e) Classify the control systems used for speed and feed. (1.5)

- (f) What are the different shapes of slideways? (1.5)
- (g) One of the requirements is machine tool should provide good surface finish, which depends on Machine tool vibrations. Explain how these vibrations can be controlled. (1.5)
- (h) Enlist the procedure for the design of power screws. (1.5)
- (i) What is criterion for the selection of machine tool? (1.5)
- (j) Enlist the model techniques used in design of machine tools. (1.5)

**PART-B**

- 2. (a) Explain the functions of machine tool structure. Also discuss about their requirements during design. (10)
- (b) Explain the method of eliminating backlash in the feed drive mechanism. (5)
- 3. (a) Define stiffness and rigidity of a machine tool and explain how static and dynamic stiffness can be analyzed. (10)
- (b) Compare various shapes of slideways in respect of their advantages and disadvantage. (5)

- 4. (a) What are the advantages of using geometric progression for deciding the spindle speeds? Draw the open and cross type speed structure diagram and the possible ray diagrams for these speed structure diagrams for  $2 \times 2$  drive having speeds N1, N2, N3 and N4. (10)
- (b) Explain in detail with the help of neat sketch the control of feed by limit switch. (5)
- 5. (a) What points should be considered for designing of spindle of a machine tool? (7)
- (b) List various types of bearing and explain parameters on which their selection for supporting the spindle of machine tool depends on. (8)
- 6. (a) Discuss the importance of automatic control in machine tools. Discuss the automatic clamping and unclamping the workpiece. (7)
- (b) Compare different section of bed. Also discuss how the rigidity of bed section is increased. (8)
- 7. (a) Explain the design tool spindles based on stiffness and strength. (8)
- (b) Explain the design of machine tools slideways in detail. (7)