10. Write short notes on (any **THREE**) :

(a) Object and procedure for acceptance test

(b) Aerostatic sideways

(c) Material for spindles

(d) Automation in feed mechanism

(e) Positional Hydraulic Control. 14

VRK/KS/14/3161/3479

Faculty of Engineering & Technology

Eighth Semester B.E. (Mech. Engg.)/Eighth Semester B.E.P.T. (Mech.) Examination

MACHINE TOOL DESIGN

Elective—III

Sections—A & B

Time—Three Hours] [Maximum Marks—80

INSTRUCTIONS TO CANDIDATES

(1) All questions carry marks as indicated.

(2) Answer **THREE** questions from Section A and **THREE** questions from Section B.

(3) Assume suitable data wherever necessary.

(4) Illustrate your answers wherever necessary with the help of neat sketches.

(5) Use of design data book is permitted.

(6) Use of Non-programmable calculator is permitted.

SECTION—A

1. (a) Explain working and Auxiliary motions in machine tools. 5

(b) Explain with neat sketches Rotary hydraulic drive and translatory hydraulic drive. 8

2. (a) Explain with neat sketch the layout of machine tool related to Lathe. 6

(b) "Provision of regulating the spindle rpm and feed rate is essential requirement of machine tools to ensure economic machining of workpiece of different materials and sizes by cutting tools of different shapes and composition". Discuss. 7

3. (a) How feed boxes are classified ? Explain feed boxes with change gears with neat sketch. 6

(b) Explain in brief the Ward-Leonard System of Stepless-Speed Regulation. 7

4. (a) What is meant by structures ? How are they classified ? State their requirements. 6

(b) State various factors affecting stiffness of machine tool structure. Also suggest the method of improving it. 7

5. Write short notes on (any **THREE**) :

(a) Material of machine tool structures.

(b) General requirements of Machine Tool Design

(c) Reversing Mechanism using spur gears.

(d) General Recommendation for developing the gear diagram.

(e) Profiles of Machine Tool Structures. 14

SECTION—B

6. (a) State the functions of Guideways. What are their major requirements ? Also state their types. 6

(b) Explain with neat sketches the shapes of slideways. 7

7. (a) Determine the width and length of straight flat hydrodynamic slideways to support a load of 700 kgf. at a sliding speed of 2m/min. The Lubricant has a kinetic viscosity of 20 CS at 50°C and a density of 0.9 gm/cm^3. Assume that the maximum permissible pressure is 2kgf/cm^2 and the minimum film thickness = 0.02 mm. If the load is supported by six composite slider bearings of the same width determine the length of each slider. 8

(b) Explain the types of Lubrication conditions that exist in the sliding surface. 5

8. (a) Explain in brief the functions and requirements of spindle units. 6

(b) What are the distinguishing features of antifriction bearing as compared to sliding bearing ? 7

9. (a) Discuss the Ergonomic Considerations applied to the design of control members like Push buttons and Handwheels. 6

(b) Explain with neat sketch the closed-loop N.C. System for simple turning operation. 7