

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VI (NEW) EXAMINATION – SUMMER 2024****Subject Code:3161921****Date:24-05-2024****Subject Name:Machine Tool Design****Time:10:30 AM TO 01:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

MARKS

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| Q.1 | (a) What are different progression ratios. | 03 |
| | (b) Differentiate between rotary and translator hydraulic drive. | 04 |
| | (c) Explain about the “working and auxiliary different motions” in machine tools. | 07 |
| Q.2 | (a) Explain Harmonic Progression? | 03 |
| | (b) What are the information required to design a speed Box. | 04 |
| | (c) Explain the following. (1) Gear Pump (2) constant delivery vane pump (3) Direction control valves. | 07 |
| | OR | |
| | (c) A 2 x 2 drive is required to be designed for transmitting speeds starting from 400 rpm with a geometric progression of 1.4. Draw a suitable structure and speed diagram. Also draw the layout of the gearbox and determine the number of teeth on each gear. | 07 |
| Q.3 | (a) Enlist profiles of machine tool structures. | 03 |
| | (b) Evaluate the applicability of cast Iron and Mild steel as a material of Machine tool. | 04 |
| | (c) List types of feed boxes and explain any one with neat sketch. | 07 |
| | OR | |
| Q.3 | (a) Enlist commonly used column sections and its applications. | 03 |
| | (b) Discuss various types of Bed structure. | 04 |
| | (c) Draw the structure diagram for following formulae.
(i) $3(2)2(1)$ (ii) $2(3)3(1)$ | 07 |
| Q.4 | (a) Explain Re-circulating ball screws. | 03 |
| | (b) Suggest the material for rolling bearing with reasons. | 04 |
| | (c) Factors Affecting Stiffness of Machine Tool Structure and methods of Improving it. | 07 |
| | OR | |
| Q.4 | (a) Enlist the various spindle ends with simple sketch. | 03 |
| | (b) Explain Anti friction guideways and Aero static guideways. | 04 |
| | (c) Explain the various forces to be considered for design of machine tool structure. | 07 |
| Q.5 | (a) Identify the machine tool components where ergonomic consideration can be applied ? | 03 |
| | (b) Explain vibration absorbers. | 04 |
| | (c) Classify control system of machine tool? Explain any one in detail. | 07 |
| | OR | |
| Q.5 | (a) Enlist different control system for speed changing. | 03 |
| | (b) Identify the machine tool components where aesthetic consideration can be applied? | 04 |

(c) Explain in brief

07

1. Machine tool chatter.
2. Adaptive Control
