Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER– II(Old course) • EXAMINATION (Remedial) – WINTER- 2015

Subject Code: 1720805 **Date: 11/12/2015**

Subject Name: **MACHINE TOOL DESIGN**

Time:2:30 pm to 5:00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Explain the different general requirements of Machine Tool Design.	**07**
	(b)	Make Block diagram of design process in respect of machine tools and explain it.	**07**
Q.2	(a)	Explain the different general selection criteria of motor for metal cutting machine tool spindles.	**07**
	(b)	Derive the equation of power consumption in cylindrical turning.	**07**
		OR	
	(b)	Explain the advantages of geometrical progression for machine tool drives.	**07**
Q.3	**(a)**	Draw the strucrtural diagrams of a machine tool speed box for n_{min}=16 rpm, n_{max}=770 rpm and ϕ=1.26. which layout is best and why?	**07**
	(b)	A four-stage, 16-step, speed box with n_{min}=32 rpm and ϕ=1.41 is powered by a two-speed(1500/750) ac motor. Draw the structural diagram and speed chart of the speed box.	**07**
		OR	
Q.3	**(a)**	What are the function of machine tool structures and their requirements?	**07**
	(b)	A bed subjected to torsional loading is constructed as a closed box-type structure, while a bed subjected to bending is constructed as an I section. Why? Give mathematical proof to support your conclusion.	**07**
Q.4	**(a)**	Which are the commonly used Column sections? Write their Application.	**07**
	(b)	Explain the effects of bolt arrangement and stiffening ribs on bending and torsional stiffness of columns.	**07**
		OR	
Q.4	**(a)**	From amongst the slideway combinations flat-flat, flat-V and V-V of a lathe, which one would provide for the least radial deflection? Substantiate your conclusion with mathematical proof.	**07**
Q.4	**(b)**	What are the function of machine tool spindle unit and their requirements?	**07**
Q.5	**(a)**	What are the features of ball re-circulating power screws? Design above for Strength under static loading.	**07**
	(b)	Explain Design aspects of Modern CNC machine tools.	**07**
		OR	
Q.5	**(a)**	Explain feedback device used for CNC machine tools.	**07**
	(b)	What are the differences in structure of CNC machine tools compare to conventional machine tools?	**07**

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