Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – WINTER • 2013

Subject code: 710801N **Date: 23-12-2013**

Subject Name: Advance Machine Design

Time: 10.30 am – 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. **Use of PSG Design Data book is permitted.**

Q.1 **(a)** What is ethics? Explain the importance of Ethics in Engineering Design. **07**

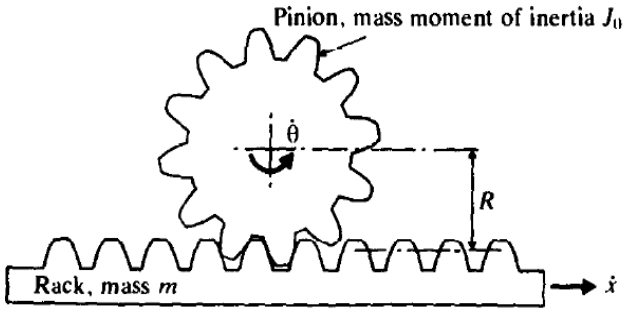
(b) Explain different strategies to improve the rigidity of mechanical component. **07**

Q.2 **(a)** What is product? Explain various Design activities at different stages in product development cycle. **07**

(b) Explain force analysis in Belt Conveyors Design. **07**

OR

(b) Explain mathematical modeling of rack and pinion arrangement where translational and rotational masses coupled together. **07**



Q.3 **(a)** What is wear? Explain different mechanism of wear. **07**

(b) Design a full hydrodynamic journal bearing with following specifications for machine tool application. **07**

Journal diameter = 75 mm
Radial load = 10 kN
Journal speed = 1440 rpm
Minimum oil film thickness = 22.5 microns
Inlet temperature = 40°c
Bearing material = Babbitt.
Determine the length of bearing and suitable oil for this application.

OR

Q.3 **(a)** What is the importance of corrected gear? Explain different methods of correction for gears. **07**

(b) Explain the importance of material handling system in Hazardous Environment. **07**

Q.4 **(a)** What is creep? Explain mathematical representation of creep curves with its significances in design. **07**

(b) Explain different testing methods of Pressure Vessels as per ASME standards. **07**

OR

Q.4 **(a)** Write significance of computer assistances in design of pressure vessels. **07**

(b) What is mechanical reliability? Explain Hazard Rate and MTBF in relation to mechanical reliability. **07**

Q.5	**(a)**	A thin disc is to be used as a rotating cutter. It is of uniform thickness except at the periphery where it is sharpened. The outer diameter of the disc may be taken as 250 mm. the disc is to be mounted on a 50 mm diameter shaft. Ignoring clamping force, calculate the speed for the disc if the maximum stress is not to exceed 200 MN/m^2.	**07**
	(b)	Explain Design for Manufacturing and Assembly DFMA.	**07**

OR

Q.5	**(a)**	A machine component is subjected to two dimensional stresses. The tensile stresses in the X - direction varies from 40 to 100 N/mm^2, while the tensile stress in the Y - direction varies from 10 to 80 N/mm^2. The frequency of variation of these stresses is equal. The corrected endurance limit of the component is 270 N/mm^2. The ultimate tensile strength of the material of the component is 660 N/mm^2. Determine the factor of safety used by the designer.	**07**
	(b)	Explain application of Quality Function Deployment in Engineering Design.	**07**

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