Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – WINTER 2012

Subject code: 710801N **Date: 08-01-2013**

Subject Name: Advanced Machine Design

Time: 02.30 pm – 05.00 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)** List and explain the important basic design aspects to be considered in design of machine components. **07**

(b) Write note on – "Design for Strength" and "Design for Rigidity" with suitable example. **07**

Q.2 **(a)** Explain in brief : Concurrent Engineering. **07**

(b) Based on design against fracture criteria discuss **07**

1. Design of steam turbine rotor
2. Design of pressure vessel.

OR

(b) A support rod in a boiler carries a constant tensile stress of 68 MPa. The rod is made of medium carbon steel for which following data are available. **07**

Strain rate (hr^{-1})	Stress (MPa)	Temp. (ºC)
5×10^{-3}	136	540
5×10^{-7}	41	540

Calculate the life time of the rod at 540ºC before it elongates by 10%.

Q.3 **(a)** With diagram explain stress distribution in rotating disc with uniform thickness when disc is (i) hollow (ii) solid **07**

(b) A hollow disc of uniform thickness has outer and inner diameter of 500 mm and 200 mm respectively. It rotates at 2400 rpm. Find the maximum radial and hoop stresses induced in it. Take $\upsilon = 0.28$ and $\rho = 7.8$ gm/cm^3. What will be the value of maximum radial stress if the disc has small central hole? **07**

OR

Q.3 **(a)** Design a Girder based on rigidity from the following data: **07**

Load capacity = 75 kN
Span = 10m
Strength = 120 N/mm^2
Girder section = I section
No of girder = 2
Plate thickness for I section = 10 mm
Permissible deformation = Span/700

(b) State and explain briefly the principles of material handling used for designing/selecting the equipments. **07**

Q.4 **(a)** Derive Stribeck's equation for determination of static load carrying **07**

capacity of rolling contact bearing.

	(b)	Explain the procedure for determining the power rating of machine cut gears.	**07**

OR

Q.4	**(a)**	What do you understand by corrected gearing? In which situation such gears are used? Enlist characteristics of corrected gears.	**07**
	(b)	Design a journal bearing with the following specifications: Journal diameter = 100 mm Journal speed = 3000 rpm Radial load = 15 kN	**07**
Q.5	**(a)**	Explain dynamic characteristic of the cutting process in machine tool design.	**07**
	(b)	Write down the DFM guidelines for design of Forging.	**07**

OR

Q.5	**(a)**	Draw and explain Mortality Curve related with reliability.	**07**
	(b)	Explain in detail "Pressure Vessel Testing"	**07**

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