Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

B.E. Sem-Vth Examination December 2010

Subject code: 151805

Subject Name: Elementary Design and Drawing

Date: 20 /12 /2010 **Time: 03.00 pm - 05.30 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)** Describe the design procedure of a machine. Illustrate your answer with suitable example. **07**

(b) Define the following mechanical properties: (i) yield stress (ii) Endurance stress (iii) Ultimate stress (iv) creep stress (v) Ductility (vi) Brittleness (vii) Hardness **07**

Q.2 **(a)** Illustrate how the stress concentration in a component can be reduced. **07**

(b) What do you mean by standardization? Explain the role of preferred numbers in standardization. **07**

OR

(b) A mild steel rod of 12mm diameter was tested for tensile strength with the gauge length of 50mm. Following observations were recorded. **07**
Final length = 80mm
Final diameter = 7mm
Yield load = 3.4KN
Ultimate load =6.1KN Calculate
(i)Yield stress (ii) Ultimate tensile stress (iii) Percentage reduction in area
(iv) Percentage elongation.

Q.3 **(a)** Define the following terms: (i) Limits (ii) Allowance (iii) Upper deviation (iv) Basic Size (v) Tolerance (vi) Fits (vii) Interchangeability **07**

(b) Two tie rods are connected by a sleeve using cotters. They are subjected to an axial pull of 50KN. Design the joint using following design stresses: **07**
For rods and cotters (Material C30): $[\sigma_t]$=60N/mm^2,
$[\sigma_c]$=70 N/mm^2, $[\tau]$= 30 N/mm^2
For sleeve(Material-cast steel): $[\sigma_t]$=65N/mm^2,
$[\sigma_c]$=100 N/mm^2,$[\tau]$= 45 N/mm^2

OR

Q.3 **(a)** How are the keys classified and Draw neat sketches of different types of keys and state their application. **07**

(b) Why are couplings employed in power transmission? Explain how a coupling transmits power from one shaft to the other shaft. **07**

Q.4 **(a)** Discuss different types of brakes giving atleast one practical application for each. **07**

(b) A 80mm long journal bearing supports a load of 2800N on a 50mm diameter shaft. The bearing has a radial clearance of 0.05mm and the viscosity of the oil is 0.021kg/m-s at the operating temperature. If the bearing is capable of dissipating 80J/s,Calculate the maximum safe speed. **07**

OR

Q.4 **(a)** State different types of belt drives. Give their merits and demerits. **07**

(b) List out the welded joints and explain the types of Butt Joints. **07**

Q.5 **(a)** What are the various permanent and detachable fastenings? **07**
Give a complete list with the different types of each category and also explain the methods of riveting.

(b) Define the following terms with neat sketch:(i)Major diameter of screw threads (ii)Minor diameter of screw threads (iii)Pitch diameter of screw threads (iv)Lead (v)Depth of thread (vi)Flank of thread (vii)Angle of thread **07**

OR

Q.5 **(a)** How are the gear classified? Explain with neat sketch. **07**

(b) A bronze spur pinion rotating at 600 r.p.m. drives a C.I. spur gear at a transmission ratio of 4:1. The allowable static stresses for the bronze pinion and C.I.gear are 84 MPa and 105 MPa respectively. The pinion has 16 standard 20° full depth involute teeth of module 8 mm. The face width of both the gears is 90mm. Find the power that can be transmitted from the standpoint of strength. **07**

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