Machine Design-1
(ME-301, May. 2007)

Time: 3 Hours Max. Marks: 60

Note: Question No. 1 is compulsory. Attempt any four questions from section B and two questions from section C.

Section-A

1. (a) What are prerequisite for design?
   (b) How will you designate plain carbon steel with minimum tensile strength of 320 N/mm^2.
   (c) What is endurance limit?
   (d) Explain the significance of Soderberg & Goodman diagram.
   (e) Define the strength of a fillet weld joints.
   (f) Define Notch sensitivity.
   (g) What is difference between caulking and fullering?
   (h) Write the expression for the shearing strength of socket collar.
   (i) What is the effect of the keyway cut into the shaft?
   (j) What is the difference between muff coupling and pin & bush coupling?

Section-B

2. State the objectives and applications of case hardened components.
3. Explain the following terms in connection with design of machine members subjected to variable loads.
   (a) Endurance limit
   (b) Size factor
   (c) Surface finish factor
4. Two lengths of shafts are connected through a flange coupling provided with four bolts of same material as shaft. The bolts are set in reamed holes located on a bolt circle of 25 mm diameter. Determine least bolt size to transmit the same torque. Justify the final bolt size.
   Chosen

	Pitch P mm	Pitch dia d_p (mm)	Major D mm	Minor dia d_c mm	Stress N/mm^2
M10	1.5	9.026	8	6.466	36.6
M12	1.75	10.863	10	8.160	58.00
M16	2.00	14.701	12	9.853	84.3

allsubjects4you.com

5. Explain the various types of pipe joints commonly used in engineering practice.
6. State the application of a foot lever. Discuss the procedure for designing a foot lever.

Section-C

7. List out various modes of failures while designing a gib and cotter joint. Explain one of them in detail.
8. (a) Find the diameter of rivet for the riveted connection as shown in Figure. Allowable shear stress = 900 kg/cm^2.

Figure.

   (b) Explain the design procedure for a lever safety valve.
9. (a) A gear transmit 50 hp at 750 rpm. It is rigidly fastened to a 4.5 cm diameter shaft made of 40 Cr 1 Mo 28 alloy steel having yield strength of 5400 kg/cm^2. Suggest a suitable key for gear. Assume a suitable factor of safety.
   (b) Explain how you would determine the strength of transverse and parallel fillet weld joint.