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Roll No. .....

ME–601(O)

B. E. (Sixth Semester) EXAMINATION, June, 2010

(Old Scheme)

(Mechanical Engg. Branch)

MACHINE DESIGN–I

[ME–601(O)]

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Attempt any *five* questions. Use of design data book is permitted. Suitably assume any missing data.

1. (a) Discuss basic requirements for machine elements and machines. 10

   (b) Explain design for realization, design for profit, process design and industrial design. 10

2. (a) Why the taper is provided in a cotter ? A single taper cotter is preferred over double taper cotter, why ? 6

   (b) Design a cotter foundation bolt to support a tensile load of 100 kN. Assume the material of the cotter and the bolt to be same. Take the following values of the permissible stresses :

   $\tau = 40\ N/mm^2$ $\sigma_t = 55\ N/mm^2$, $\sigma_c = 105\ N/mm^2$. 14

P. T. O.

3. (a) Under what conditions the use of a knuckle joint is recommonded ? Name some of the engineering applications of a knuckle joint. 6

   (b) Design the suspension link of a structure which is subjected to a load of 160 kN. The allowable stresses in tension, shearing and crushing are 100 N/mm^2, 75 N/mm^2 and 150 N/mm^2 respectively. The width of each side link is 50 mm. 14

4. Design a screw jack for load capacity of 100 kN. Lifting height is 0·5 m. 20

5. (a) Compare dry and wet clutch design. 5

   (b) (i) Determine the main dimensions of a cone clutch. It is to be faced with leather and is to be transmit 30 kW at 750 r. p. m. from an electric motor to an air compressor.

   (ii) Find the axial force that must be produced by the spring. 15

6. Explain the working of internal expanding shoe brake with neat sketch. Also desive an expression for total braking torque. 20

7. (a) Compare the stress distribution in a thin and thick wall pressure vessel. 10

   (b) A cast iron cylinder of internal diameter 200 mm and thickness 50 mm is subjected to a pressure of 5 N/mm^2. Calculate the tangential and radial stresses at the inner, middle (radius = 125 mm) and other surface. 10

8. Write short notes on the following :
   (a) Factor of safety for steady and variable loads
   (b) Isolation and transmissibility
   (c) Aesthetic consideration in design
   (d) Shock and impact consideration in design