No. of Printed Pages : **3 + Drawing Sheet**

BIME-008

01251

B.Tech. MECHANICAL ENGINEERING (BTMEVI)

Term-End Examination

December, 2013

BIME-008 : MACHINE DESIGN - I

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt **any five** questions. All questions have **equal** marks. Assume missing data suitably if any. Use of Design Data HandBook is **allowed**.*

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1. Explain the difference between cotter and knuckle joints and give their uses. **14**

Design a boiler joint for a steam pressure of $2.2N/mm^2$. The inside diameter of the boiler is 1.25 meter and desired efficieney of the longitudinal joint is 80%. Design the longitudinal joint.

2. What is meant by fatigue strength of a material ? How it can be improved ? Explain. **14**

The shaft of an axial flow rotary compressor is subjected to a max. torque of 2400N-m and a max. bending moment of 3200N-m. Design the shaft as per ASME code. Also design a suitable coupling to connect this shaft.

3. What is meant by endurance limit ? Discuss the type of stresses induced in the section of a helical compression spring. **14**

Calculate the diameter of wire required for a coil spring for spring loaded safety valve if :

(a) Mean dia of the spring =125mm

(b) Spring rate =8kN/mm

(c) Working load =8kN

4. (a) Design a vertical screw jack to lift or lower a load of 40 kN to a height of 250mm. Select suitable materials from design data hand book. **10+4**

(b) Explain how a toggle (horizontal) screw jack is different than this.

5. Discuss the basic design cycle and explain how the environmental/ ergonomic reliability and reverse engineering concepts are utilised. **14**

6. A hydraulic punching press is required to punch 40mm diameter hole in a plate of 15mm thickness at the rate of 30 holes per minute. It requires 8N-m of energey per square milimeter of sheared area. Determine the moment of inertia of the flywheel if the punching takes one tenth of a second. The rpm of the flywheel varies from 160 to 140. **14**

7. Write short notes on **two** of the following : **7x2=14**

(a) CAD advantages and limitations

(b) Eccentric loading of riveted joints

(c) Pneumatic press

(d) Concurrent engineering