0611

DIPLOMA IN MECHANICAL ENGINEERING (DME)

Term-End Examination, 2019

BME-060 : MACHINE DESIGN

Time : 2 Hours   **Maximum Marks : 70**

Note : Attempt **five** questions in all. Question No. **1** is **compulsory**. All questions carry **equal marks**. Use of scientific calculator and design data handbook is permitted.

1. Explain the following in brief :   [7x2=14]

     (a)   Hardness

     (b)   Fatigue

     (c)   Normalising

     (d)   Coupling

     (e)   Ductility

(f)   Nut and Bolts

(g)   Proof Resilience

2   (a)   Explain stress - strain diagram for a ductile material. What properties can you define with the help of this diagram?   [7]

    (b)   How do you select good material for designing of machine elements? Explain.   [7]

3   (a)   Define welding. How does welding joint differ from riveted joint from design point of view?   [7]

    (b)   A butt welded joint with ground and flush surface is subjected to a tensile load which varies from 25 KN to 75 KN and the plates are 10 mm thick. Determine the length of weld required for 200000 cycles.   [7]

4   (a)   What do you understand by overhauling and self locking screws? Explain.   [7]

    (b)   What are the factors to be considered while selecting a key? List out the applications of keys.   [7]

5 (a) Why couplings are employed in mechanical power transmission? State its applications. [7]

(b) Determine the safety margins (factor of safety) in different modes of failure for a key used to transmit 3.5 KN at 225 rpm. The diameter of shaft is 30 mm. The key may be assumed to be made of steel with maximum shear stress 360 N/mm² [7]

6 (a) What do you mean by alloy steel? Write the effect of the following elements on steel: [7]

(i) Nickel

(ii) Chromium

(b) A shaft of diameter 100 mm transmits a torque of 6 kN-m. A flanged coupling is keyed to the shaft by means of a 28 x 16 x 100 mm long. The couplings has 6 bolts of 20 mm diameter arranged along a bolt circle diameter (ped) 30 mm. Calculate stresses induced in the shaft, key and bolts. [7]

7. Write short notes on any **four** of the following:[4 x 3.5=14]

(a) Cotter joints

(b) Heat Treatment Process

(c) Bearing Material

(d) AGMA and Indian Standards

(e) Piston Ring and Gudgeon Pin

(f) Dynamic Tooth Load

----- X -----