Cat. No: Meen. 3107   Marks: 50

Title: Machine Design (1+1)   Time : 2 hours

I. Choose the correct Answers: (10 x 1=10)

1. The process which improves the machinability of steels, but lower the hardness & tensile strength is

   a) Normalizing   b) Full annealing   c) Process annealing   d) Spheroidising

2. The energy stored in a body when strained with in elastic limit is known as

   a) Resilience   b) Proof Resilience   c) Strain Energy   d) Input Energy

3. A bolt M24 X 2 means

   a) The pitch of thread is 24 mm and depth is 2 mm   b) The cross sectional area of thread is 24mm^2 c) The nominal diameter of bolt is 24mm and pitch is 2mm   d) The effective diameter of bolt is 24 mm and there have two threads per cm

4. In steam engine the piston rod is usually connected to a cross head by means of a

   a) Knuckle Joint   b) Universal Joint   c) Flange   d) Cotter Joint

5. The shaft made of same materials, the diameter of 1st shaft is twice that of IInd shaft. The power transmitted by the Ist shaft will be ---------of IInd shaft

   a) Twice   b) Four Times   c) Eight Times   d) Six Times

6. The material suitable for the belts used in a agricultural equipment is

   a) Cotton   b) Rubber   c) Leather   d) Belata

7. The contact ratio for gear is

   a) Zero   b) Less than one   c) Greater than one   d) None of these

8. Hook's law holds good up to

   a) Yield point   b) Elastic point   c) Breaking point   d) Plastic point

9. A screw is specified by it's

   a) Major Diameter   b) Minor Diameter   c) Pitch Diameter   d) Pitch

10. The taper on cotter varies from

    a) 1 in 15 to 1 in 10   b) 1 in 24 to 1 in 20   c) 1 in 32 to 1 in 24   d) 1 in 48 to 1 in 24

II. Write short notes/answers on ANY FIVE: (5x 2=10)

1. What are the factors to be considered for the selection of materials for the design of machine elements?

2. Explain the general procedure in machine design.

3. Define the term load, stress and strain.

4. What do you understand by single start and double start thread?

5. What is a key? State its functions.

6. What types of stresses included in shafts?

7. What are the important factors considered for the selection of a belt drive?

III Write answers on ANY FIVE:

1. Define mechanical property of an engineering material. State any five mechanical properties.

2. Define the following

   i Resilience   ii Proof resilience   iii Modulus of resilience

3. Distinguish between cotter joint and knuckle joint.

4. Explain with the help of neat sketch the types of various shaft couplings.

5. A soild shaft is transmitted 1 MW at 240 rpm. Determine the diameter of the shaft if the maximum torque transmitted exceeds the mean torque by 20 %. Take the maximum allowable shear stress as 60 Mpa.

6. Discuss the different types of belts materials used for power transmission.

7. Write short notes on gear drives giving their merits and demerits.

IV. Write essay on any ONE

(1 x 10=10)

1. A bronze spur pinion rotating at 600 rpm drives a cast iron spur gear at a transmission ratio of 4:1. The allowable static stress for the bronze pinion and cast iron gear are 84 Mpa and 105 Mpa respectively. The pinion has 16 standard 20^0 full depth involute teeth of module 8mm. The face width of both the gears is 90 mm. Find the power that can be transmitted from the standpoint of strength.

2. Design a belt drive to transmit 110kw for a system consisting of two pulleys of diameters 0.9m and 1.2m, centre distance of 3.6m, a belt speed 20m/sec, coefficient of friction 0.3, a slip of 1.2% at each pulley and 5% friction loss at each shaft, 20% over load.

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