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NME-509

(Following Paper ID and Roll No. to be filled in your Answer Books)

Paper ID : 2289920 Roll No. | | | | | | | | | | |

B.TECH

Regular Theory Examination (Odd Sem-V), 2016-17

MACHINE DESIGN

Time : 3 Hours *Max. Marks : 100*

SECTION - A

1. Attempt all questions. Each will carry equal marks. (10×2=20)

a) How do you distinguish between a thick and thin cylinder?

b) Define : fatigue, creep,

c) What do you understand by Notch sensitivity?

d) What do you mean by factor of safety?

e) Define theoretical form stress concentration factor.

f) What are the different types of keys used in couplings?

g) Explain Caulking and fullering process.

h) Write the various types of lever.

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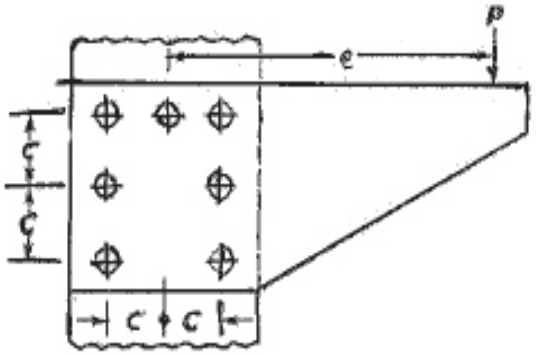
is 25 mm thick. All rivets are to be of same size. Load on the bracket P = 50 kN; Rivet spacing C = 100 mm; Load arm e = 400 mm. Permissible shear stress is 65 MPa and crushing stress is 120 MPa. Determine the size of the rivet to be used for the joint.



11. Design a cast iron protective type flange coupling to transmit 15 kW at 900 rpm. From an electric motor to a compressor. The service factor may be assumed as 1.35. The following permissible stresses may be taken as ;

Shear stress for shaft, bolt and key material = 40 MPa

Crushing stress for bolt and key = 80 MPa

Shear stress for cast iron = 8 MPa

12. Explain various types of machine design. Explain the various factors affecting machine design.

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i) Define the various types of riveted joints.

j) Write down the process of adopt pitch of the riveted joints.

SECTION - B

Attempt any five questions. Each question carries equal marks. (5×10=50)

1. Give general consideration/requirements in machine design in detail also draw the design procedure of a machine element.

2. A solid circular shaft is subjected to a bending moment of 3000 Nm and a torque of 10000 Nm. The shaft is made of 45 C steel having ultimate tensile stress of 700 MPa and ultimate shear stress of 500 MPa. Assuming a factor of safety as 6. Determine the diameter of the shaft.

3. Explain the AUTOCADD. Describe any ten commands used in AUTOCADD.

4. Explain the types of flat belt drive and drive the expression for ratio of diameter of pulleys in terms of velocity.

5. Determine the length the weld run for a plate of size 120 mm wide and 15 mm thick is to be welded to another plate by means of A single transverse weld and a double parallel fillet welds when the joint is subjected to variable load. Stress induced in weld is 120 N/mm^2. Tensile stress and shear stress may be taken as 70 MPa and 56 MPa respectively.

6. Design a longitudinal joint for a 1.25 m diameter steam boiler to carry a steam pressure of 2.5N/mm2. The ultimate strength of the boiler plate may be assumed as 420MPa, crushing strength as 650MPa & shear Strength as 300MPa. Take the joint efficiency as 80%. Assume FOS = 5.

7. Find efficiency of following riveted joints :

a) Single riveted lap joint of 6 mm plates with 20 mm diameter rivets having a pitch of 50mm.

b) Double riveted lap joint of 6mm plates with 20mm diameter rivets having a pitch of 65mm.

8. Design a muff coupling which is used to connect two steel shafts transmitting 40KW at 350rpm. Material for shaft & key is plain carbon steel for which allowable shear & crushing stresses may be taken as 40MPa & 80MPa respectively. Material for muff is cast iron for which allowable shear stress is 15MPa.

9. A cast iron cylinder of internal diameter 200 mm and thickness 50 mm is subjected to a pressure of 5MPa. Calculate the tangential and radial stress at the inner and outer and middle surface. If the middle radius of the cylinder is 125 mm.

SECTION - C

Attempt any two questions. Each question carries equal marks. (2×15=30)

10. An eccentrically loaded lap riveted joint is to designed for a steel bracket as shown in figure. The bracket plate