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BIME-025

01952

DIPLOMA VIEP MECHANICAL ENGINEERING

Term-End Examination

December, 2011

BIME-025 : DESIGN OF MACHINE ELEMENTS

Time : 2 hours *Maximum Marks : 70*

Note : *Attempt **any four** question between **02** to **08**. And **first** question is **compulsory**. Design Data book is allowed.*

1. (a) Stress concentration factor is defined as the ratio of : **2x7=14**

(i) Maximum stress to the endurance limit

(ii) Nominal stress to the endurance limit

(iii) Maximum stress to the nominal stress

(iv) Nominal stress to the maximum stress

(b) A basic shaft is one whose ?

(i) Lower deviation is zero

(ii) Upper deviation is zero

(iii) Lower and upper deviation are zero

(iv) None of these

(c) Two shafts will have equal strength, if :

(i) Diameter of both the shafts is same

(ii) Angle of twist of both the shaft is same

(iii) Material of both the shaft is same

(iv) Twisting moment of both the shafts is same

(d) The taper on a rectangular sunk key is :

(i) 1 in 16

(ii) 1 in 32

(iii) 1 in 48

(iv) 1 in 100

(e) The sleeve or muff coupling is designed as a :

(i) Thin cylinder

(ii) Thick cylinder

(iii) Solid shaft

(iv) Hollow shaft

(f) When helical compression spring is cut into halves, the stiffness of the resulting spring will be :

(i) Same (ii) Double

(iii) One - half (iv) One - fourth

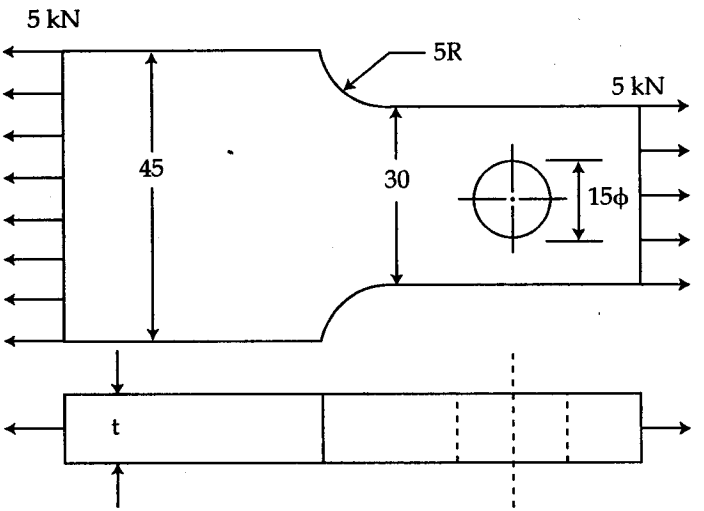
(g) The ratio of equivalent length of a column, having one end fixed and the other end free, to its length is :

(i) 2 (ii) $\sqrt{2}$

(iii) $1/2$ (iv) $1/\sqrt{2}$

2. Discuss the system Design cycle with neat and clean diagram. 14

3. A flat plate subjected to a tensile force of 5 kN is shown in fig. 1. The plate material is grey cast iron FG200 and the factor of safety is 2.5. Determine the thickness of the plate. 14



4. Derive expression when shaft subjected to twisting moment only. 14

5. Write short note with neat and clean diagram. 14

(a) Muff coupling

(b) Flange coupling

6. A close coiled spring has mean diameter of 75 mm and spring constant of 80 kN/m. It has 8 coils. What is the suitable diameter of the spring wire if maximum shear stress is not to exceed 250 MN/m^2 ? **14**

Modulus of rigidity of the spring wire material is 80 GN/m^2.

What is the maximum axial load the spring can carry.

7. A bar of length 4m when used as a simply supported beam and subjected to a uniformally distributed load of 30 kN/m over the whole span, deflects 15 mm at the centre. Determine the crippling loads when it is used as a column with following end conditions : **14**

(a) Both ends pin jointed

(b) One end fixed and other end hinged ; and

(c) Both end fixed

8. Write short notes. Attempt ***any four*** of the following : **4x3.5=14**

(a) S.N. Curve

(b) Endurance limit

(c) Notch Sensitivity

(d) Fatigue Failure

(e) Goodman diagram

(f) Design for finite and Infinite life