Unit–IV

8. A centrifugal clutch is to be designed to transmit 15 kW at 900 rpm. The shoes are four in number. The speed at which engagement begins is 3/4th of the running speed. The inside radius of the pulley rim is 150 mm. The shoes are lined with Ferrodo for which coefficient of friction may be taken as 0.25. Determine :

   (a) Mass of shoes

   (b) Size of the shoes 15

9. (a) Discuss the condition of self-locking and self-energizing brake.

   (b) How does function of brake differ from clutch ? List important factors upon which capacity of brake depends. 7,8

Roll No. : .....

Total No. of Questions : **9**] [Total No. of Pages : **4**

3313

B.Tech. (ME) 6th Semester (Supplementary) Examination, July–2021

(G Scheme)

DESIGN OF MACHINE ELEMENT–I

Paper–PCC–ME–304–G

*Time : **Three** Hours]* *[Maximum Marks : 75*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note :– Attempt *five* questions in all, selecting *one* question from each Unit. Question No. **1** is compulsory. All questions carry equal marks.

1. Explain the following :

   (i) Economical and financial feasibility.

   (ii) Differences between clutches and brake.

(iii) Classification of engineering materials.

(iv) Selection of belt.

(v) Self-locking condition of brake.

(vi) Selection of fits. $2\frac{1}{2} \times 6 = 15$

Unit–I

2. (a) What do you mean by technical feasibility ? Explain various types of feasibility study in context of design philosophy.

   (b) Explain problem statement with suitable examples. 10,5

3. (a) What are the key parameters for selection of engineering materials ? Explain them.

   (b) What do you mean by factor of safety ? Explain factor of safety for ductile and brittle material. 10,5

Unit–II

4. A plate 100 mm wide and 12.5 mm thick is to be welded to another plate by means of parallel fillet welds. The plates are subjected to load of 50 kN. Find the length of the weld so that the maximum stress does not exceed 56 N/mm^2. Consider the joint first under static loading and then under fatigue loading. 15

5. A double riveted double cover butt joint in plate 20 mm thick is made with 25 mm diameter rivet at 100 mm pitch. The permissible stress in tension 120 N/mm^2, shear 100 N/mm^2 and in crushing 150 N/mm^2. Find joint efficiency taking the strength of rivet in double shear as twice than single shear. 15

Unit–III

6. (a) What are the factors influencing selection of a belt ? Explain different types of belts.

   (b) Derive expression of length for a open belt drive. 7,8

7. Design a muff coupling which is used to connect two steel shaft transmitting 40 kW at 350 rpm. The material for shaft and key is plain carbon steel for which allowable shear stress and crushing stress may be taken as 40 N/mm^2 and 80 N/mm^2 respectively. The material for the cast iron for which the allowable shear stress may be assumed as 15 N/mm^2. 15