

Roll No.

24258

B.Tech 5th Semester (Mechanical Engg. VII)

Examination – December, 2013

MECHANICAL MACHINE DESIGN-I

'F' Scheme

Paper : ME-303-F

Time : Four hours]

[Maximum Marks : 100

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 Part. Q. No. 1 is *compulsory*. Attempt any *eight* parts of Q. 1

1. (a) What is technical feasibility ? Explain.
- (b) Define brain storming.
- (c) State and explain fits and tolerances.
- (d) Explain factor of safety.
- (e) What is power screws ?
- (f) Explain knuckle joint with diagram.

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- (g) What is the condition for transmission of maximum power ?
- (h) Explain Kennedy keys.
- (i) What is the function of an automotive clutch ?
- (j) What is 'Back-stop' band brake. $2.5 \times 8 = 20$

PART – A

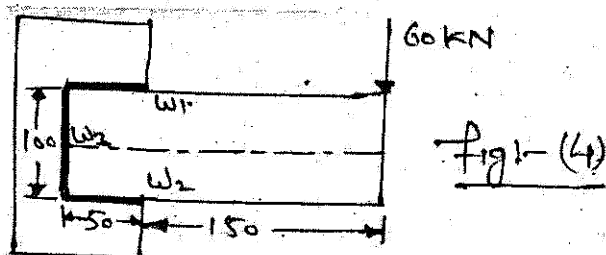
- 2. (a) What are the steps involved in design of a machine elements ? 10
- (b) Calculate the fundamental deviation and tolerances and hence obtain the limits of sizes for the hole and shaft in the following fit : 60mm H_8F_7 . The diameter steps are 50 mm and 80 mm. 10
- 3. (a) What are the factors to be considered for selection of material for a machine component ? 10
- (b) Write the classification of Engg. Materials. 10

PART – B

- 4. A welded connection, as shown in fig (4), is subjected to an eccentric force of 60KN in the plane of the welds. Determine the size of the welds, if the permissible shear

stress for the weld is 100 N/mm^2 . Assume static conditions.

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5. It is required to design a cotterjoint to connect two steel rods of equal diameter. Each rod is subjected to an axial tensile force of 50 kN . Design the joint and specify its main dimensions.

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PART - C

6. A pulley, made of gray cast Iron FG 150, transmits 10 kW of power at 720 rpm . The diameter of pulley is 500 mm . The pulley has four arms of elliptical cross-section, in which the major axis is twice of the minor axis. Determine the dimensions of the cross section of the arm. If the factor of safety is 5.
7. It is required to design a rigid type of flange coupling to connect two shafts. The input shaft transmits 37.5 kW power at 180 rpm to output shaft through the coupling. The service factor for the application is 1.5.

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i.e, the design torque is 1.5 times of the rated torque. Select suitable materials for the various parts of the coupling, design the coupling and specify the dimensions of its components. 20

PART - D

8. A centrifugal clutch, transmitting 20 KW at 750 r.p.m consists of four shoes. The clutch is to be engaged at 500 r.p.m. The inner radius of the drum is 165 mm. The radius of the centre of gravity of the shoes is 140 mm, when the clutch is engaged. The coefficient of friction is 0.3, while the permissible pressure on friction lining is 0.1 N/mm^2 Calculate : 20

- (i) The mass of each shoe ; and.
- (ii) The dimension of friction lining.

9. What is the condition of self-locking in differential band brake ? Why should it be avoided in speed-control brakes ? In what applications are self-locking differential band brakes used ? 20