B.E./B.Tech. (Full Time) END SEMESTER EXAMINATIONS NOV / DEC 2011

MANUFACTURING ENGINEERING

IV SEMESTER – (REGULATIONS 2004)

ME 374 –DESIGN OF MACHINE ELEMENTS

Time: 3 hours Maximum marks: 100.

PART – A (10 x 2 = 20 Marks)

1. What is shaft basis system?
2. What is impact load? List two examples.
3. What are the different criteria of shaft design
4. Why flexible bush is used in bushed-pin type flexible coupling
5. How is a bolt designated? Give examples.
6. What is lap weld?
7. Differentiate between close coiled and open coiled helical spring
8. When belleville spring is used?
9. Define the co-efficient of fluctuation of energy for flywheel
10. How rolling contact bearings are designated

PART – B (5 x 16 = 80 Marks)

11.It is required to design a rigid type flange coupling to connect two shafts and transmit 3.7 kW power at 180 r.p.m. The service factor is 1.5. Select the suitable materials for various parts of the coupling and design the coupling.

12.(a) A cylindrical shaft, made of steel having yield strength 760 N/mm^2, is subjected to a static load consisting : bending moment of 15 kN-m and torsional moment of 25 kN-m. If the required tactor of safety is 2.5, determine the diameter of shaft using :(i) the maximum shear stress theory, and(ii) the maximum strain energy theory.Assume E = 200 GPa and v = 0.25

(OR)

12(b) A steel cantilever beam, shown **in fig. 12(b)** is subjected to a transverse loading at its ends that varies from 45 N up to 135 N down and an axial load that varies from 110 N (Compressive) to 450 N (tensile). Determine the required diameter at the change of cross-section for infinite life using a factor of safety of 2.

Assume the following data : Yield strength in tension and compression = 470 N/mm2, Ultimate tensile strength = 550 N/mm^2,Theoretical stress concentration factor = 1.63,Notch sensitivity = 0.8,Surface finish factor = 0.9,Size factor = 0.85

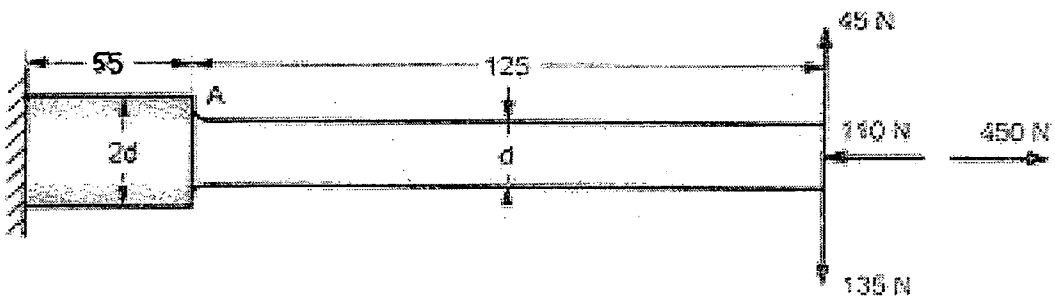

Fig 12 b.

13(a) A bracket is welded to a column as shown in **fig.13(a)** Determine the size of the weld, if permissible shear stress in the weld is 80 N/mm^2.

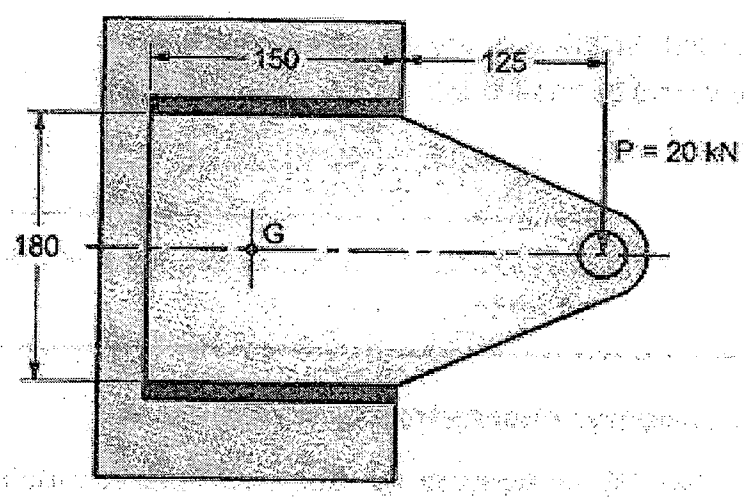

Fig.13 (a)

(OR)

15(a) A machine with a constant resisting torque is driven by an I.C. engine. The torque developed by the engine is given by an expression : $T = 4000 + 1500 \sin \theta + 4000 \sin 2\theta$ N-m. A rimmed flywheel made of grey cast iron FG 150 ($\rho = 7000$ kg/m^3) is used to maintain speed of the engine between 200 r.p.m. and 210 r.p.m. The rim contributes 90% of the required mass moment of inertia. A maximum diameter of the flywheel is limited to 2.1 m. If the factor of safety is 7.5, design the flywheel. Neglect the effect of restraint of arm on the flywheel rim.

(OR)

15(b) A full journal bearing of 50 mm diameter and 100 mm length has a bearing pressure of 1.4 N/mm^2. The speed of the journal is 900 r.p.m. and the ratio of journal diameter to the diametral clearance is 1000. The lubricating oil used has absolute viscosity at operating temperature of 75° is 0.011 kg / m-s. The room temperature is 35°. Determine the amount of artificial cooling required and the mass of lubricating oil required if the difference between the outlet and inlet temperature of the oil is 10°. Take specific heat of oil as 1850 J/kg/ °C.