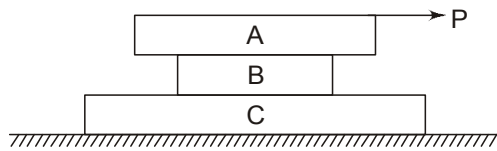


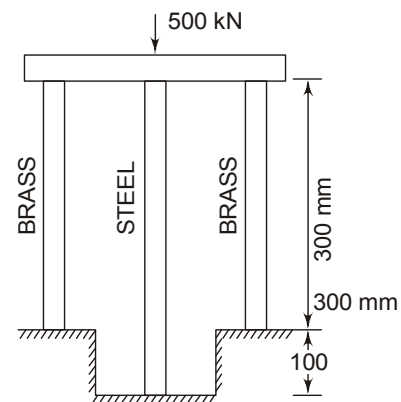
Mechanical Engineering (Paper II)

- What is Law of Machine ? Also find out relationship between Load, Mechanical Advantage and Efficiency. (15)
 - Explain the different design considerations, on which the design of Disc clutch is based. Also find out the relationship for Torque capacity of the Clutch, in each case. (15)
 - Find out the condition for Constant velocity ratio between two Gear wheels. (15)
 - What is Hydrodynamic Bearing? Explain Hydrodynamic lubrication theory, with assumptions and variables involved. (15)
- A body is dropped from rest at height h . It covers a distance of $\frac{9h}{25}$ in the last second. Determine the height h .
Take $g = 10 \text{ m/s}^2$. (15)
 - Consider a system of three blocks resting upon one another as shown below. The block A weighs 150 N, B weighs 50 N and C weighs 100 N. The coefficients of friction are 0.3 between A and B, 0.2 between B and C and 0.1 between C and the ground. Determine the least horizontal force P necessary to start motion of any part of the system. (15)



- A solid shaft of 80 mm diameter is transmitting 100 kW power at 200 rpm. Calculate the maximum shear stress induced in the shaft and the angle of the twist in degrees for length of 6 m. Take Modulus of Rigidity of the material = $8 \times 10^4 \text{ N/mm}^2$. (15)
- A steel rod of cross sectional area 2000 mm^2 and two brass rods each of cross sectional area of 1200 mm^2 together support a load of

500 kN as shown in the following figure. Find the stresses in the rods. Take E for Steel = $2 \times 10^5 \text{ N/mm}^2$ and E for Brass = $1 \times 10^5 \text{ N/mm}^2$. (15)



- 0.3 kg of Nitrogen gas at 100 kPa and 40°C is contained in a cylinder. The piston is moved compressing Nitrogen until the pressure becomes 1 MPa and temperature becomes 160°C . The work done during the process is 30 kJ. Calculate the heat transferred from Nitrogen to the surroundings. C_v for Nitrogen = $0.75 \text{ kJ/kg} - \text{K}$. (15)
 - Find the coefficient of performance and Heat transfer rate in the condenser of a refrigerator in kJ/h, which has a refrigeration capacity of 12000 kJ/h when power input is 0.75 kW. (15)
 - Determine the amount of heat, which should be supplied to 2 kg of water at 25°C to convert it into steam at 5 bar and 0.9 dry. (15)
 - Differentiate between Impulse and Reaction Steam Turbines. (15)
- Showing Otto cycle on P-V and T-S diagram, find out Air standard efficiency of the cycle. (15)
 - Explain normal Combustion phenomenon in SI Engine. (15)

2 Question Paper 2012

- (c) How reverse Carnot cycle can be used in achieving Refrigeration ? Explain and also find out COP of the cycle. (15)
- (d) What are the factors on which selection of Boiler is done ? Also, differentiate between Fire tube and Water tube Boiler? (15)
5. (a) What is the Newton's law of Viscosity? A plate 0.025 mm distant from a fixed plate, moves at 60 cm/sec and requires a force of 2 N/m² to maintain this speed. Determine the viscosity of the fluid between the plates. (15)
- (b) Differentiate between (15)
- (i) Laminar and Turbulent flow
 - (ii) Compressible and Incompressible flow
 - (iii) Rotational and Irrotational flow
- (c) What is the principle on which pitot tube works? Also, show the arrangements, adopted with Pitot tube, in order to get the velocity of flow in a pipe at any pipe. (15)
- (d) What are the various considerations, based on which, Turbines can be classified ? (15)
6. (a) What are the important properties of Moulding sand ? (15)
- (b) Describing Oxy Acetylene welding process, also explain the types of flames used in it. (15)
- (c) What do you understand by Forging process? Also discuss its types. (15)
- (d) What is Milling Operation ? Also describe differences between Up and Down Milling. (15)