

Dronacharya College of Engg. , Khentawas

Mech. Engg. Deptt.

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Subject: MMD-I

Subject Code: ME- 303 F

Semester: V

IMPORTANT QUESTIONS

1. Explain the main properties of engineering materials that are important in deciding their suitability for manufacturing of different kinds of machine elements.
2. Design a single plate clutch when it transmits 15Kw at 1000r.p.m.
3. Explain the basic procedure for mechanical engineering design.
4. Discuss the advantages of standards in machine design.
5. Why factor of safety is used in design of machine parts? What aspects should be considered while selecting a factor of safety?
6. Design a single plate clutch when it transmits 20Kw at 1500r.p.m.
7. Design a rectangular key for a shaft of 75mm diameter. The shearing & crushing stresses for the key material are 50MPa & 75MPa respectively.
8. Discuss the advantages of standards in machine design.
9. Why factor of safety is used in design of machine parts? What aspects should be considered while selecting a factor of safety?
10. Discuss preliminary design & detailed design.
11. Design a rectangular key for a shaft of 75mm diameter. The shearing & crushing stresses for the key material are 50MPa & 75MPa respectively.
12. Design & draw a cotter joint subjected to slow reversal of 30kN load.
13. Explain various types of brakes indicating the applications.
14. What do you mean by self energizing condition of brakes?

15. A multiple disc clutch is to be made up of 6 steel & 5 bronze discs, with an inner radius of 25mm. determine the outer diameter & the axial pressure to transmit a torsional moment of 17.5Nm.
16. Design & draw a cotter joint subjected to slow reversal of 30kN load.
17. A double riveted lap joint with zig-zag riveting is to be designed for 13mm thick plates. If the stresses are: 80MPa in tension; 60MPa in shear & 120MPa in crushing. State how the joint will fail and find the efficiency of the joint.
18. Design a double riveted butt joint with two cover plates for the longitudinal seam of a boiler shell 1.5m in diameter subjected to a steam pressure of 0.95 N/mm^2 . Assume joint efficiency as 75%, allowable tensile stress in the plate 90MPa; compressive stress 140MPa; and shear stress in the rivet 56MPa.
19. Design a knuckle joint to transmit 150kN. The stresses may be taken as 75MPa in tension, 60MPa in shear & 150MPa in compression.
20. Design a cotter joint to support a load varying from 30kN in compression to 30kN in tension. The load is statically applied and the stresses are: tensile stress = compressive stress = 50MPa; shear stress = 35MPa and crushing stress = 90MPa.
21. Define metals & describe at least 10 mechanical properties of metals.
22. A belt drive consists of two V-belts in parallel, on grooved pulleys of the same size. The angle of the groove is 30° . The cross-sectional area of each belt is 750mm^2 and $\mu = 0.12$. The density of the belt material is 1.2Mg/m^3 and the maximum safe stress in the material is 7MPa. Calculate the power that can be transmitted between pulleys of 300mm diameter rotating at 1500r.p.m. find also the shaft speed in r.p.m. at which the power transmitted would be a maximum.
23. Design a rectangular key for a shaft of 60mm diameter. The shearing & crushing stresses for the key material are 45MPa & 75MPa respectively.
24. Design a knuckle joint to transmit 165kN. The stresses may be taken as 75MPa in tension, 60MPa in shear & 150MPa in compression.
25. Explain the phenomenon of Thermal Considerations in brake designing.
26. Explain the following phenomenon:
 - a) Self energizing condition of brakes, and
 - b) Thermal Considerations in brake designing.
27. Two shafts whose centres are 1m apart are connected by a V-belt drive. The driving pulley is supplied with 95kw power and has an effective diameter of 300mm. it runs at 1000rpm while the driven pulley runs at 375rpm. The angle of groove on the pulley is 40° . Permissible tension in 400mm^2 cross-sectional area belt is 2.1MPa. the material of the belt has density of 1100kg/m^3 . The driven pulley is overhung, the distance of the centre from the nearest bearing being 200mm. the coefficient of friction between belt and pulley rim is 0.28.

Estimate: a) the number of belts required; and b) Diameter of driven pulley shaft, if permissible shear stress is 42MPa.

28. Design a cast iron flange coupling for a mild steel shaft transmitting 90kW at 250rpm. The allowable shear stress in the shaft is 40MPa and the angle of twist is not to exceed 1° in a length of 20 diameters. The allowable shear stress in the coupling bolts is 30MPa.