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Total number of pages: [2]

Total number of questions: 09

B.Tech. – ME / 6th Sem.

Machine Design-II

Subject Code: ME-302

Paper ID:

Batch: 2004 onwards/2011 onwards/2015 onwards

Time allowed: 3 Hrs

Max Marks: 60

Important Instructions:

- Section A is compulsory
- Attempt any four questions from section B
- Attempt any two questions from section C
- Assume any missing data, use of data book is allowed.

PART A (2×10)

Q. 1. Answer in brief:

- (a) What is the material used for lining of friction surfaces?
- (b) What are the thermal considerations in the brake design?
- (c) State the two most important reasons for adopting involute curves for a gear tooth profile.
- (d) Explain what do you understand by A. M. Wahl's factor and state its importance in the design of helical springs?
- (e) Sketch a 6 x 19 wire rope and name its parts.
- (f) Chain drives are not suitable for timing applications, why?
- (g) What is positive clutch and where it is used?
- (h) How do you classify the bearings?
- (i) Define 'Sommerfeld number'.
- (j) What is the general structure of CAD software?

PART B (5×4)

- Q. 2. Determine the maximum, minimum and average pressure in a plate when the axial force is 4 KN. The inside radius of contact surface is 50 mm and the outside radius is 100 mm. Assume uniform wear.
- Q. 3. A band brake has to absorb 4.5 k W at 150 rpm. For long life, the maximum pressure between lining and drum is 0.7MPa. The width of band is 50 mm and $\mu = 0.12$. Find the angle of wrap if the brake drum diameter is 300 mm.
- Q. 4. Explain surge in the spring in detail.
- Q. 5. Explain in detail the stresses induced in the flywheel with their causes.

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- Q. 6. Describe the detail design process for computer aided design. Discuss, how use of computers assist a designer in each stage of the design process with respect to reducing the time and providing wider spectrum to design solutions.

PART C (10×2)

- Q. 7. Design a rubber belt to drive a dynamo generating 20 KW at 2250 rpm and fitted with pulley 200 mm dia. Assume dynamo efficiency to be 85%. Allowable stress for belt material is 2.1 N/mm^2 ; Density of the rubber is 1000 kg/m^3 ; angle of contact 165 degree and coefficient of friction between belt and pulley is 0.3.
- Q. 8. An engine developing 45 KW at 1000 rpm is fitted with a cone clutch built inside the flywheel. The cone has face angle 12.5 degree and the maximum mean diameter of 500 mm. The coefficient of friction is 0.2. The normal pressure on the clutch face is not to exceed 0.1 N/mm^2 . Determine: 1) the face width required and 2) The axial spring force necessary to engage the clutch.
- Q. 9. A pair of helical gear with 30 degree helix angle is used to transmit 15KW at 10000 rpm of the pinion. The velocity ratio is 4:1. Both the gears are made of hardened steel of static strength 100 N/mm^2 . The gears are 20 degree stub and pinion is to have 24 teeth. Face width may be taken as 14 times the module. Find the module and face width from the standpoint of strength and check the gears for wear.