

MAY 2019

B.Tech. (MECHANICAL ENGINEERING) , 6th SEMESTER
Machine Design- II (MU 308)

Time: 3 Hours

Max. Marks:60

- Instructions:*
1. It is compulsory to answer all the questions (2 marks each) of Part -A in short.
 2. Answer any four questions from Part -B in detail.
 3. Different sub-parts of a question are to be attempted adjacent to each other.
 4. Use of Design Data book is allowed.

Part-A (10X2=20 marks)

- Q1 (a) When a shaft is subjected to combined twisting moment (T) and bending moment (M), then the equivalent twisting moment is equal to..... (2)
- (b) How are bearings mounted? (2)
- (c) Write two functions of a flywheel. (2)
- (d) What are two most usual causes of failures of crankshaft? (2)
- (e) What is the effect of surface factor on fatigue strength ? (2)
- (f) What is the effect of reliability factor on fatigue strength ? (2)
- (g) What is the effect of film thickness in bearing? (2)
- (h) Sketch the cross section of a connecting rod . (2)
- (i) Explain the effect of heat generation in design of gears. (2)
- (j) What is the use of C-clamp? (2)

Part-B(4X10=40)

- Q2 Design a helical gear to transmit 40 kW from the following data:
 Helix angle = 30° , Speed of pinion = 1500 rpm,
 Pressure angle = 20° FDI, Velocity ratio = 4,
 No of teeth on pinion = 24, Static stress for CI = 55 N/mm^2 ,
 BHN for pinion and gear material = 370,
 Young's modulus of elasticity for pinion and gear material = $2.1 \times 10^5 \text{ N/mm}^2$. (10)
- Q3 (a) Explain the Selection of suitable lubricants for bearing. (5)
- (b) A deep groove ball bearing has a rated static and dynamic load capacity of 4150 N and 4750 N respectively. The bearing has to take an axial load of 2075 N and a radial load of 4000 N. Find the expected life of the bearing. (5)
- Q4 Find the diameter of a solid steel shaft to transmit 20 kW at 200 r.p.m. The ultimate shear stress for the steel may be taken as 360 MPa and a factor of safety as 2. If a hollow shaft is to be used in place of the solid shaft, find the inside and outside diameter when the ratio of inside to outside diameters is 0.5. (5)
- Q5 (a) What are reasons for stress concentration?. How can it be minimized?. (5)
- (b) Describe fatigue design for finite life against combined variable stresses using Goodman and Soderberg's Criterion. (5)

- Q6 (a) Determine the dimensions of an I-section connecting rod for a petrol engine from the wing data: (5)
Diameter of the piston = 110 mm; Mass of the reciprocating parts = 2 kg; Length of the connecting rod from centre to centre = 325 mm; Stroke length = 150 mm; R.P.M. = 1500 with possible over speed of 2500; Compression ratio = 4 : 1; Maximum explosion pressure = 2.5 N/mm^2 .
- (b) Describe stepwise procedure for design of the crane hook. (5)
- Q7 (a) A punching machine is driven by 3KW, 1000RPM powered motor with a gear set of 5:1 and a stroke length of 250mm. Rated capacity of the punching machine is 22KN. Consider coeff. of fluctuation of speed, $C_s = 0.02$, take 500mm to be the max size of the flywheel dia. Calculate the mass moment of inertia required for the flywheel of the punching press machine. (5)
- (b) Describe stepwise procedure for design of the flywheel. (5)