

209604**MAY, 2019****B.Tech. (MECHANICAL ENGINEERING),****6th SEMESTER****Machine Design- II (ME-308-C)**

Time : 3 Hours]

[Max. Marks : 75

Instructions :

1. *It is compulsory to answer all the questions (1.5 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

1. (a) Why pressure angle is generally taken as 20° ? (1.5)
- (b) How are bearings mounted? (1.5)
- (c) Write two functions of a flywheel. (1.5)
- (d) What are two most usual causes of failures of crankshaft? (1.5)
- (e) What is the effect of surface factor on fatigue strength? (1.5)
- (f) What is the effect of reliability factor on fatigue strength? (1.5)

- (g) What is the meaning of various terms in a screw M10X1.5? (1.5)
- (h) Why square threads are used in screw jack? (1.5)
- (i) Explain the effect of heat generation in design of gears. (1.5)
- (j) What is the use of C-clamp? (1.5)

PART-B

2. Design a helical gear to transmit 30 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 = 350,

Young's modulus of elasticity for pinion and gear material = $2.1 \times 10^5 \text{ N/mm}^2$. (15)

3. (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. (10)

4. A screw jack is required to lift a load of 5 kN. The jack has screw with square threads having two threads per 12 mm length. If the coefficient of friction between nut and screw is 0.08 and outer diameter is 60 mm, find the force required at the end of 600mm long lever to lift the load. Sketch the screw jack with the dimensions. (15)
5. (a) Why dissimilar materials are used for worm and worm wheel? And explain the designation 4/29/10.6/2.5/50 used for the pair of worm and worm gear. (5)
- (b) Describe fatigue design for finite and infinite life against combined variable stresses using Goodman and Soderberg's Criterion. (10)
6. (a) Determine the dimensions of an I-section connecting rod for a petrol engine from the following data :
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 . (10)
- (b) Describe stepwise procedure for design of the crane hook. (5)

7. (a) A punching machine is driven by 3 KW, 1000 RPM powered motor with a gear set of 5 : 1 and a stroke length of 250 mm. Rated capacity of the punching machine is 22 KN. Consider coeff. of fluctuation of speed, $C_s = 0.02$, take 500 mm to be the max size of the flywheel dia. Calculate the mass moment of inertia required for the flywheel of the punching press machine. (10)
- (b) Describe stepwise procedure for design of the flywheel. (5)
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(E)