

02/06/2015

QP Code : 8593

(REVISED COURSE)

(4 Hours)

[Total Marks : 100

- N.B. :**
- Question No. 1 is compulsory.
 - Attempt any four questions from the remaining.
 - Assumption made should be clearly stated.
 - Use of PSG Design Data Book is permitted.

- Q.1 **Answer any four** 20
- Write assumption made by Lewis and derive Lewis equation for the bending strength of Gear tooth.
 - Explain the properties of bearing material.
 - Draw the pulley arrangement for six fall system and explain function of Compensating pulley.
 - Explain priming and Cavitation in Centrifugal pump
 - What change in the loading of a ball bearing will cause the expected life to be doubled
- Q.2 Design a pair of steel Helical gears to transmit 15 KW at 1440 rpm of pinion. The desire transmission ratio is 4:1. Write constructional details with neat sketches. 20
- Q.3 (a) Find the module of the bevel gear and check it for wear load for the following specification. 10
Power transmitted: 25KW
Input Speed: 360rpm
Reduction Ratio: 3
Angle between shaft: 90°
- (b) A full journal bearing ($\beta = 360^\circ$) is use for supporting a load of 7KN runs at 500 rpm for machine tool application. Select fit H9e9 and Take L/D = 1. Find. 10
- Bearing dimensions,
 - Sommerfeld Number,
 - Minimum oil film thickness,
 - Coefficient of friction,
 - Rise in temp. of oil.

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- Q.4 (a) A DGBB having SKF No. 6207 subjected to load cycle as below which is repeated. Find the probability for expected life of 1000 Hrs. Take Service factor, $S = 1.2$ 15

Phase	Radial Load (N)	Thrust Load (N)	Speed (rpm)	%
I	3000	1000	600	15
II	3500	1000	800	20
III	5000	100	900	30
IV	500	2000	1500	35

- (b) Discuss advantages and disadvantages of Rolling contact bearing over sliding contact bearing. 5
- Q.5 (a) For the following specification of an EOT Crane, 6
Application - Class II
Load to be Lifted - 140 KN
- Design a rope of 6x37 type and find its life. 6
 - Design the crane hook and find induced stresses at most critical section. 5
 - Select suitable single Thrust ball bearing. 2
 - Design Cross Piece. 4
 - Design Shackle plate. 3
- Q.6 (a) How to control the pressure angle in Cam, Explain. 4
- (b) A Rotary disc cam with central translatory roller follower has following motion. 16
Forward Stroke of 22mm in 100° of cam rotation with SHM motion, dwell of 50° of cam rotation and return stroke of 22mm in 90° of cam rotation with SHM. Remaining dwell to complete the cycle. Mass of the follower is 1.5 Kg and cam shaft speed is 500 rpm. The maximum pressure angle during forward stroke and return stroke is limited to 25° . The external force during forward stroke is 600 N and that of return stroke is 100N. Find cam dimension, roller follower along with pin and spring.
- Q.7 (a) Explain the terms NPSH and its significance in Centrifugal Pump. 5
- (b) Refer the data given for a Centrifugal Pump.
Manometric Head: 24m
Discharge: 1200LPM
- Decide diameters of the suction and delivery pipes. 3
 - Select the type of motor and determine the power and speed. 3
 - Design the impeller (impeller dia., inlet and outlet vane angles, no. of vanes, width at inlet and outlet.) 6
 - Design the shape of volute casing. 3