R13

SET - 1

III B. Tech II Semester Supplementary Examinations, November - 2018
DESIGN OF MACHINE MEMBERS– II
(Mechanical Engineering)

Time: 3 hours   Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**
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PART –A

1	a)	State the applications of bearings.	[3M]
	b)	What are the stresses induced in Crankshafts	[4M]
	c)	What are the desirable properties of cylinder materials? Name the materials used for engine cylinder.	[3M]
	d)	Differentiate stress distribution between the straight and curved beams.	[4M]
	e)	Describe the 6 X 19 wire rope construction. List its applications.	[4M]
	f)	Explain the design procedure of Crank Pin.	[4M]

PART –B

2   a)   A particular bearing application provides a life of 5000 hours for 90% reliability. [4M]
What are the corresponding lives for 50% and 99% reliability?

b)   The following data is given for a full, hydrodynamic bearing: [12M]
Journal speed =1440 rpm, journal diameter = 60 mm, Bearing length = 60 mm, radial clearance = 0.06 mm, Radial load = 3 kN, viscosity of lubricant = 30 cP. Assume that total heat generated due to friction in bearing is carried by the total lubricant flow. Calculate: (a) coefficient of friction (b) minimum oil thickness (c) flow requirement, (d) temperature rise, (e) power lost in friction.

3   a)   Design crank pin and crank web of an overhung crankshaft for a 300 × 350 mm single [10M]
cylinder vertical engine using the following data:
The engine is vertical and the crank is at the top dead centre position
Maximum gas pressure = 2.5 MPa; (L/r) ratio = 4.5
Assume suitable data and state the assumptions made.

b)   Differentiate between an overhung crankshafts and centre crank shafts.   [6M]

4   Design a cast iron piston for a single acting four stroke engine from the following [16M]
data;
Cylinder Bore = 100 mm; Stroke = 120 mm; Speed = 2000 rpm;
Maximum gas pressure = 5 MPa; Break Mean Effective Pressure = 0.5 MPa
Fuel consumption is 0.15 kg per kW hour break power.

5   The section of a crane hook is trapezium. At the critical section, the inner and outer [16M]
sides are 40 mm and 25 mm respectively and depth is 75 mm. The center of curvature of the section is at a distance of 60 mm from the inner fibers and the load line is 50 mm from the inner fibers. Determine the maximum load that the hook can carry if the maximum stress is not to exceed 120 MPa

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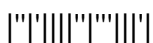
6 a) A pulley is driven by a flat belt running at a speed of 600 m/min. The coefficient of friction between the pulley and the belt is 0.3 and the angle of lap is 160°. If the maximum tension in the belt is 700 N; find the power transmitted by a belt. [8M]

   b) In a hand vice, the screw has double start square threads of 24 mm outside diameter. If the lever is 200 mm long and the maximum force that can be applied at the end of lever is 250 N, find the force with which the job is held in the jaws of the vice. Assume a coefficient of friction of 0.12. [8M]

7   Design a pair of spur gears with stub teeth to transmit 50 kW from a 150 mm pinion running at 2250 rpm to a gear running at 1500 rpm. Both the gears are made of steel having B.H.N. 260. Approximate the pitch by means of Lewis equation and then adjust the dimensions to keep within the limits set by the dynamic load and wear equation. [16M]

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