Hall Ticket Number :

Code: 1G565

III B.Tech. II Semester Supplementary Examinations October 2020
Design of Machine Elements-II
(Mechanical Engineering)

Max. Marks: 70   Time: 3 Hours

Answer any **five** questions
All Questions carry equal marks (**14 Marks** each)
****

1. Design a journal bearing to support a load of 5000N at 720rpm using a hard hardened steel journal and a bronze backed babbit bearing. The bearing is lubricated by oil rings, room temperature is 25⁰C and oil temperature is 82⁰C.

2. A four stroke internal combustion engine has the following specifications: Brake power=7.5kW; Speed=1000r.p.m; Indicated mean effective pressure=0.35N/mm^2 Maximum gas pressure = 3.5 N/mm2 ; Mechanical efficiency = 80%. Determine:
   i. The dimensions of the cylinder, if the length of stroke is 1.4 times the bore of the cylinder
   ii. Wall thickness of the cylinder, if the hoop stress is 35 MPa
   iii. Thickness of the cylinder head and the size of studs when the permissible stresses for the cylinder head and stud materials are 45 MPa and 65 MPa respectively.

3. a) Explain the various stresses induced in the connecting rod.

   b) Find the diameter of steel connecting rod for an engine in which the maximum load on the piston is 700 KN, crank of the engine is 0.6 m radius connected rod length 3m, FOS=8.

4. The crane hook carries a load of 20 kN as shown in figure below. The section at X-X is rectangular whose horizontal side is 100 mm. Find the stresses in the inner and outer fibers at the given section.

Section at X-X
All dimensions in mm.
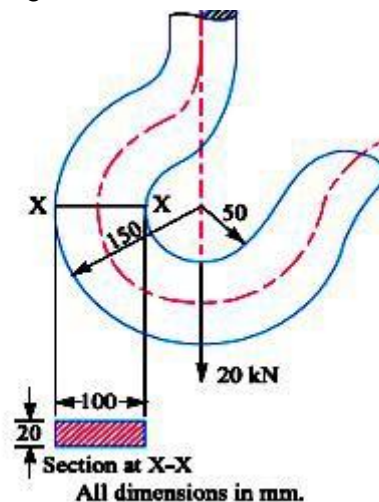
5. A 100mm wide and 10 mm thick belt transmits 5kW of power between two parallel shafts. The distance between the shaft centers is 1.5m and the diameter of the smaller pulley is 440mm. The driving and the driven shafts rotate at 60 rpm and 150 rpm respectively. The coefficient of friction is 0.22. Find the stress in the belt if the two pulleys are connected by (i) Open belt drive and (ii) Cross belt (Take $\mu = 0.22$)

6. a) Derive the Lewis equation for the beam strength of a gear tooth.

   b) Briefly explain the design procedure for Helical gears.

7. a) What is the significance of Whal's Factor?

   b) The mean diameter of a helical torsion spring is 40 mm. The torque applied on the spring is 70 N-m. The spring index is 8, and the number of coils is 10. The permissible stress in the spring is 400MPa, and E = $2x10^5$ MPa. Determine the diameter of the wire and deflection under the torque.

8. a) Explain overhauling and self-locking.

   b) Discuss various types of power threads and give atleast two practical applications for each type.

<div align="center">***</div>