Code No: **R32035** **R10** **Set No. 1**

III B.Tech II Semester Supplementary Examinations, November - 2017

DESIGN OF MACHINE MEMBERS– II

(Code book is permitted)

(Mechanical Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions

All Questions carry equal marks

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1 a) Distinguish the "Hydrodynamic" and "Hydrostatic Bearings" with figures and suitable applications. [8M]

b) A bearing is required to carry 4500 N stationary radial load. The shaft rotates at 1000 rpm and the life desired is 30000 hrs. The running conditions are steady, no shock loading select a suitable bearing. [7M]

2 A connecting rod is required to be designed for a high speed four stroke I.C engine. The following data are available diameter of piston=88 mm. Mass of reciprocating parts=1.6Kg. Length of connecting rod (centre to centre) =300mm, stroke =125 mm. The RPM =2220 (when developing 50KW) possible over speed =3000rpm; Compression ratio =6.8:1 (approximately); probable maximum explosion pressure (assumed shortly after dead centre say at about 3^0) =3.5N/mm^2 Draw fully dimensioned drawings of the connecting rod showing the provision for the lubrication. [15M]

3 A four stroke internal combustion engine has following specifications: Break power = 7.5KW, speed =1000rpm, indicated mean effective pressure =0.35N/mm^2 maximum gas pressure =3.5N/mm^2, mechanical efficiency =80%. Determine [15M]
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 35MPa.
iii)Thickness of the cylinder head & the size of studs when the permissible stress for the cylinder head & stud materials are 45MPa and 65MPa respectively.

4 A crane hook is of trapezoidal cross-section having inner side 80 mm, outer side 30 mm and depth 120mm. The radius of curvature of the inner side is 80 mm. If a load of 100KN is applied to the hoop passing through the center of curvature, determine the maximum tensile and compressive stresses at the critical cross-section. [15M]

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5 a) What are various types of belts? List out the some essential factors for the selection of a belt drive. [8M]

b) Determine the percentage increase in power capacity made possible in changing over from flat belt drive to a V-belt drive. The diameter of the flat pulley is same as the pitch diameter of the grooved pulley. The pulley rotates at the same speed as the grooved pulley. The coefficient of friction for the grooved and flat belt is same and is 0.3. The V- belt pulley groove angle is 60^0. The belts are of the same material and have same cross sectional area. In each case, the angle of wrap is 150^0. [7M]

6 a) Write the expression for static strength, limiting wear load and dynamic load for helical gears and explain the various terms used. [8M]

b) Two precision cut forged helical gears have 200 full depth involute teeth. The angle of helix is 23^0. Permissible static bending stress 100MPa, module 3mm, face width 500mm. The speed of rotation of pinion 900rpm gear ratio 5:1 surface endurance strength 630MPa. Find the transmitted and wear load and state whether the design is safe? [7M]

7 a) Explain two ways of making a bolt of uniform strength. [8M]

b) An eye bolt is to be used for lifting a gear box of weight 25KN. Determine the nominal diameter of the bolt if the permissible tensile stress for the bolt material is 100MPa when [7M]
i) Coarse threads are used ii) Fine threads are used.

8 a) Write a note on stiffness and rigidity of machine tools and Classify the guide ways. What is the function of guide way? [8M]

b) What are the important factors to be consider while designing milling machine tool beds? Briefly discuss. [7M]

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