YMCA UNIVERSITY OF SCIENCE & TECHNOLOGY FARIDABAD

B.TECH EXAMINATION (UNDER CBS) DECEMBER 2018

MACHINE DESIGN-II (MU-308)

Time: 3 Hrs. MM: 60

Part-I is compulsory. Attempt any four questions from Part-II. Design data handbook is allowed.

Part-I

Q-1 (i) What are ergonomic considerations in design?

(ii) What are Goodman & Soderberg criteria's of fatigue life?

(iii) With design point of view which shaft among solid & hollow is better & why?

(iv) Explain Buckingham equations.

(v) Why helical gears are called helical?

(vi) What is difference between hydrodynamic & hydrostatic?

(vi) What is a zero film bearing?

(vii) Explain the usefulness of turning moment diagram of flywheel.

(viii) What are skew & crown gears?

(ix) What are coefficient of fluctuation of energy and speed?

(ix) What are the drawbacks of worm gear drive?

Part-II

Q-2 A 25 mm diameter shaft is made of forged steel with ultimate stress 600 N/mm^2. There is a step in shaft and the stress concentration factor at the step is 2.1. The notch sensitivity factor is 0.84. Determine the endurance limit of the shaft if it is subjected to a reversed bending moment. **10**

Q-3 A propeller shaft is required to transmit 50 KW power at 600 rpm. It is a hollow shaft having an inside diameter 0.8 times of outside diameter. It is made of steel (S_y=380 N/mm^2) and FOS is 4. Calculate inside & outside diameter of the shaft. **10**

Q-4 The load on the journal bearing is 150KN due to turbine shaft of 300 mm diameter at 1800 rpm. Determine the following: i) Length of the bearing if the allowable bearing pressure is 1.6 N/mm^2, and ii) Amout of heat to be removed by the lubricant per minute if the bearing temperature is 60^0 C and viscosity of oil is 0.02 Kg/m-s and the bearing clearance is 0.25 mm. **10**

Q-5 An engine develops 20 KW at 300 rpm. The work done by the gases during the expansion stroke is 2.3 times the work done on the gases during the compression and the work done during the suction & exhaust strokes is negligible. The speed is to be maintained within ± 1%. Determine the mass moment of inertia of the flywheel. **10**

Q-6 A pair of parallel helical gears consists of a 20 teeth pinion meshing with a 100 teeth gear. The pinion rotates at 720 rpm. The normal pressure angle is 20°, while the helix angle is 25°. The face width is 40 mm and the normal module is 4 mm. The pinion as well as the gear is made of steel 4OC8 (S_{ut} = 600 N/mm2) and heat treated to a surface hardness of 300 BHN. The service factor and the factor of safety are 1.5 and 2 respectively. Assume that the velocity factor accounts for the dynamic load and calculate the power transmitting capacity of gears. **10**

Q-7 Derive the expression for static strength, limiting wear and dynamic load for helical gears and explain the various terms used therein. **10**