# YMCA UNIVERSITY OF SCIENCE & TECHNOLOGY, FARIDABAD

### B. Tech. (Mech. Engg.) VI Semester (UNDER CBS)
### MACHINE DESIGN –II (MU-308)

Time: 3 Hours                                                                                    Max. Marks: 60

Note:    1. It is compulsory to answer the questions of Part -1. Limit your answers within 20-40 word in this part.

2. Answer any four questions from Part -2 in detail.

3. Different parts of the same question are to be attempted adjacent to each other.

4. Use of unmarked Design Data Book is allowed.

5. Assume suitable standard data wherever required, if not given.

6. All the notations and symbols have their usual meanings.

## PART -1

Q1 (a)  How will you account for stress concentration in design of machine parts?          (2)

(b)  What are the advantages of hollow shafts over the solid shafts?          (2)

(c)  Where do you use helical gears?          (2)

(d)  What are draw backs of worm gear dives?          (2)

(e)  What are the functions of crank shaft?          (2)

(f)  What are the objectives of lubrication?          (2)

(g)  Differentiate between flywheel and speed governor.          (2)

(h)  Differentiate between helical and bevel gear.          (2)

(i)  What is stress concentration?          (2)

(j)  Explain static and dynamic loading of shaft?          (2)

## PART -2

Q2    A transmission shaft of cold drawn steel 27Mn2 ($S_{ut}$=500 N/mm$^2$ and $S_{yt}$ = 300          (10) N/mm$^2$) is subjected to a fluctuating torque which varies from -100 N-m to +400 N-m. The factor of safety is 2 and expected reliability is 90%. Neglecting

1

the effect of stress concentration, determine the diameter of the shaft.

Q3 (a) A propeller shaft is designed to transmit 45 kW power at 500 rpm. It is a (5) hollow shaft, having an inside diameter 0.6 times of outside diameter. It is made of plain carbon steel and the permissible shear stress is 84 N/mm$^2$. Calculate the inside and outside diameters of the shaft.

(b) What is the difference between a shaft and an axle? Enumerate the cases of (5) shaft failure.

Q4 It is required to design a pair of spur gear with 20° full-depth involute teeth based on the Lewis equation. The velocity factor is to be used to account for dynamic load. The pinion shaft is connected to a 10 kW, 1440 rpm motor. The (10) starting torque of the motor is 150% of the rated torque. The speed reduction is 4:1. The pinion as well as the gear is made of plain carbon steel 40C8 ($S_{ut}$ = 600 N/mm$^2$). The factor of safety can be taken as 1.5. Design the gears, specify their dimensions and suggest suitable surface hardness for the gears.

Q5 Discuss the following (i) turning moment diagram (ii) coefficient of fluctuation (3+3+ of energy and speed (iii) design of rimmed flywheel. 4)

Q6 Differentiate between hydrodynamic lubrication and hydrostatic lubrication. ((3+3+ List various applications of thin film bearing. Also explain the design of full 4) journal bearing.

Q7 Determine the dimensions of cross section of the connecting rod for a diesel (10) engine with the following data: cylinder bore = 100 mm, length of connecting rod = 350 mm, maximum gas pressure = 4 MPa and factor of safety = 6.

**************