

GUJARAT TECHNOLOGICAL UNIVERSITY**BE – SEMESTER- VII EXAMINATION-SUMMER 2023****Subject Code: 2170202****Date: 30/06/2023****Subject Name: Automobile Component Design****Time: 10:30 AM TO 01:30 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

		MARKS
Q.1	(a) Explain the design considerations in forging	03
	(b) Explain the concept of preferred numbers and series in design.	04
	(c) What are the design considerations for machining and assembly in design.	07
Q.2	(a) Explain the merits and demerits of roller bearing over journal bearing	03
	(b) What are the different modes of gear teeth failures?	04
	(c) Derive the expression for beam strength of spur gear	07
	OR	
Q.3	(c) Explain the steps involved in selection of roller bearing from manufacturer's catalogue.	07
	(a) What are the causes of generation for dynamic forces while two gear teeth mate with each other?	03
	(b) Explain the important parameters affecting the design of journal bearing.	04
	(c) It is required to design a pair of spur gears with 20° full depth involute teeth based on Lewis equation. The velocity factor is to be used for dynamic load. The pinion shaft is connected to a 10kW ,1440 rpm motor. The 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, having $S_{ut} = 600 \text{ N/mm}^2$. Take a factor of safety of 1.5. Design the gears ,specify the dimensions and suggest suitable surface hardness for gears. The Lewis form factor is 0.308	07
	OR	
Q.4	(a) What is meant by dynamic load carrying capacity of a bearing?	03
	(b) What are the desirable properties of cylinder materials?	04
	(c) A pair of worm gears is designed as 1/30/10/8. Calculate: i) the centre distance, ii) the speed reduction, iii) the dimensions of worm, iv) the dimensions of worm wheel.	07
	(a) Define 'formative number of teeth' in helical gear	03
Q.5	(b) Why I section is more preferred for connecting rod?	04
	(c) A pair of helical gears consists of a 20 teeth pinion meshing with a 40 teeth gear. The helix angle is 25° and the normal pressure angle is 20°. The normal module is 3 mm. Calculate: i) the transverse module, ii) the transverse pressure angle, iii) the axial pitch, iv) the pitch circle diameters of pinion and gear, v) the centre distance, vi) the addendum and dedendum circle diameters of the pinion.	07
	OR	
Q.4	(a) Differentiate between 'interference' and 'undercutting' in gears	03
	(b) What are the functions of piston rings?	04
	(c) Explain the stepwise design procedure for connecting rod	07
Q.5	(a) Why a greater number of thin piston rings are provided rather than small number of thick pins?	03
	(b) Discuss the guidelines for selecting a suitable lubricant for bearings	04
	(c) Why the design of exhaust valve more critical than that of inlet valve? Also explain characteristics of the material used for making valves.	07

OR

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| Q.5 | (a) | Define following terms associated with gear tooth: i) Circular pitch, ii) Face width, iii) Module. | 03 |
| | (b) | State the advantages and disadvantages of worm gear drives | 04 |
| | (c) | Explain Synchromesh Gearbox with a neat sketch | 07 |
