GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–VII(NEW) EXAMINATION – SUMMER 2019

Subject Code:2170202   **Date:16/05/2019**
Subject Name:Automobile Component Design
Time:02:30 PM TO 05:30 PM   **Total Marks: 70**
Instructions:
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Only PSG Design data Book is allowed during Examination.**

Q.1	**(a)**	Discuss the design considerations for forging.	**03**
	(b)	Explain the concept of preferred numbers and series in design.	**04**
	(c)	What is creep? Explain the situations where creep is a serious problem.	**07**

Q.2	**(a)**	Give the advantages and disadvantages of rolling contact bearing over sliding contact bearing.	**03**
	(b)	Explain the important parameters affecting the design of journal bearing.	**04**
	(c)	A spur pinion having 20 teeth is to mesh with a gear having 43 teeth. The pinion and gear are to be made of plain carbon steels having ultimate tensile strengths of 600 N/mm^2 and 400 N/mm^2 respectively. The pinion is to be driven by a three phase induction motor having speed of 1440 rpm and 10 kW rating. The starting torque of motor is twice the working torque. Surface hardness of the gear pair is to be 400 BHN. Design a gear pair with a factor of safety 1.5. Assume 20 degree full depth involutes tooth system.	**07**

$$Y = 0.487 - \frac{2.87}{Z}, \quad K_v = \frac{6}{6+V}$$
$$K = 0.16\left[\frac{BHN}{100}\right]^2$$

OR

	(c)	A pair of parallel helical gears consists of 20 teeth pinion meshing with 100 teeth gear. The pinion rotates 720 r.p.m. The normal pressure angle is 20°, while the helix angle is 25°. The face width is 40 mm and normal module is 4 mm. the pinion is made of plain carbon steel 55C8 ($S_{ut} = 720$ N/mm^2) while the gear is made of plain carbon steel 40C8 ($S_{ut} = 580$ N/mm^2). The pinion and gear are heat treated to a surface hardness of 350 BHN and 300 BHN respectively. The service factor and factor of safety are 1.5 and 2.0. Assume the other data and calculate power transmitting capacity of helical gear pair.	**07**

Q.3	**(a)**	Define following terms: 1) Circular pitch 2) Face width 3) Module.	**03**
	(b)	What is meant by corrosive wear of gear tooth? Mention its causes and remedies.	**04**

	(c)	Explain synchromesh gear box with neat sketch.	**07**

<p align="center">OR</p>

Q.3	**(a)**	What are the considerations while designing gear box?	**03**
	(b)	Explain merits and demerits of worm gear.	**04**
	(c)	Derive the beam strength equation for straight bevel gear tooth.	**07**
Q.4	**(a)**	Differentiate dry liners and wet liners.	**03**
	(b)	Why "I" section is more preferred for connecting rod?	**04**
	(c)	Design an engine cylinder for the following specifications. Brake power = 5 kW, speed = 1200 r.p.m., indicated mean effective pressure = 0.35 N/mm^2, mechanical efficiency = 80%. **Take σ_t = 42 MPa For Cylinder Head** **σ_t = 65 MPa For stud**	**07**

<p align="center">OR</p>

Q.4	**(a)**	Give the detail classification of gear box.	**03**
	(b)	The conical valve of I.C. engine is 60 mm in diameter and is subjected to a maximum gas pressure of 4 N/mm^2. The safe stress in bending for the valve material is 46MPa. The valve is made of steel for which k= 0.42. The angle at which valve disc seat is tapered is 30°. Determine thickness of valve head, stem diameter and maximum lift of the valve.	**04**
	(c)	Explain the design procedure for crankshaft.	**07**
Q.5	**(a)**	Explain different types of piston rings.	**03**
	(b)	Which kinds of materials are used for bearings?	**04**
	(c)	Design a piston for single cylinder four stroke diesel engine with following specification. Cylinder bore = 0.30 m, stroke length = 0.375 m, maximum gas pressure = 8 Mpa, break mean effective pressure = 1.15 Mpa, brake specific fuel consumption = 0.22 kg/kW-h, speed = 500 r.p.m. assume additional suitable data.	**07**

<p align="center">OR</p>

Q.5	**(a)**	What do you mean by standardization?	**03**
	(b)	What do you understand by fluctuation of energy?	**04**
	(c)	Explain the design of connecting rod.	**07**

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