

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-VI (OLD) - EXAMINATION – SUMMER 2017****Subject Code: 160201****Date: 10/05/2017****Subject Name: Automobile Component Design****Time: 10:30 AM to 01:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Discuss causes of failure in rolling contact bearing. **07**  
 (b) Explain any two terminologies related to spur gear? **07**  
 A pair of spur gear consists of a 20 teeth pinion meshing with 120 teeth gear. The module is 4 mm. Calculate,  
 1) The center distance.  
 2) The pitch circle diameter of pinion and gear,  
 3) The gear ratio.
- Q.2** (a) What are the principles for the design of machined components? **07**  
 (b) Explain the following terms in relation with rolling contact bearing **07**  
 1) Bearing life. 2) Equivalent load.
- OR**
- (b) Explain design consideration for casting. **07**
- Q.3** (a) Explain design procedure for spur gear. **07**  
 (b) A pair of helical gears is to transmit 15 Kw. The teeth are 20° stud in diametric plane and have a helix angle of 45°. The pinion runs at 10000 rpm and has 80mm pitch diameter. The gear has 320 mm pitch diameter. If the gears are made of cast steel having allowable static strength of 100 Mpa determine a suitable module and face width from static strength consideration.  
 Assume tooth form factor  $Y=0.175-0.841/T_E$ ,  $C_v = 0.75/0.75+\sqrt{v}$  and maximum face width may be taken as 12.3m where m is module.
- OR**
- Q.3** (a) Differentiate between dry liner and wet liner. **07**  
 (b) Give list of different types of gearbox used in vehicle. Explain any one in detail with sketch. **07**
- Q.4** (a) Explain design procedure for piston in internal combustion engine. **07**  
 (b) The bore of a cylinder of the four stroke engine is 150mm. the maximum gas pressure inside the cylinder is limited to 3.5 Mpa. The cylinder head is made of grey cast iron having permissible stress 40N/mm<sup>2</sup> and Stud are used to fix the cylinder head to the cylinder and obtained leak proof joint They are made of steel with permissible stress 50N/mm<sup>2</sup>. Determine  
 (1) The thickness of cylinder head  
 (2) Number of studs  
 (3) Diameter of studs
- OR**
- Q.4** (a) Sketch a valve gear mechanism, name different parts of the same and list materials of Valve and rocker arm. **07**  
 (b) A cast iron piston for a single acting four stroke engine for the following given data. Cylinder bore = 100mm, stroke = 125mm, maximum gas pressure = 5N/mm<sup>2</sup>, mean effective pressure = 0.75 N/mm<sup>2</sup>, Mechanical efficiency = 80%, fuel consumption = 0.15 Kg per brake power per hour, higher calorific value of fuel = 42000 KJ/kg, speed = 2000 rpm, determine (1) dimensions of head **07**

(2) radial ribs (3) dimensions of piston ring section  
Any other data required for the design may be assumed.

- Q.5** (a) Explain design consideration of piston and selection of piston material in I C engine. **07**
- (b) Differentiate between involute and cycloidal profile of the gears. **07**
- OR**
- Q.5** (a) Explain design procedure for connecting rod. **07**
- (b) Explain advantages and disadvantages of helical gears over the spur gear. **07**

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