

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VII (NEW) - EXAMINATION – SUMMER 2018

Subject Code:2170202

Date:03/05/2018

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) What do you mean by standardization? Describe its significance. **03**
(b) Discuss the design considerations for casting. **04**
(c) Explain the design considerations for machining and assembly consideration in design. **07**

- Q.2** (a) What is preloading of rolling contact bearing? Why it is necessary? **03**
(b) Explain the important parameters affecting the design of journal bearing and State the materials used for the bearings. **04**
(c) The thrust of propeller shaft is absorbed by 6 collars. The rubbing surfaces of these collars have outer diameter 300 mm and inner diameter 200 mm. If the shaft runs at 120 r.p.m., the bearing pressure amounts to 0.4 N/mm². The coefficient of friction may be taken as 0.05. Assuming that the pressure is uniformly distributed, Determine the power absorbed by the collars. **07**

OR

- (c) A shaft rotating at constant speed is subjected to variable load. The bearings supporting the shaft are subjected to stationary equivalent radial load of 3 kN for 10 percent of time, 2 kN for 20 percent of time, 1 kN for 30 percent of time and no load for remaining time of cycle. If the total life expected for the bearing is 20×10^6 revolutions at 95 per cent reliability, calculate dynamic load rating of the ball bearing. **07**

- Q.3** (a) Define the following terms: **03**
(i) Pressure Angle (ii) Diametral Pitch (iii) Backlash
(b) Explain in detail the principal types of failure of gear tooth due to wear **04**
(c) A bronze spur pinion rotating at 600 r.p.m. drives a cast iron spur gear at a transmission ratio of 4 : 1. The allowable static stresses for the bronze pinion and cast iron gear are 84 MPa and 105 MPa respectively. The pinion has 16 standard 20° full depth involute teeth of module 8 mm. The face width of both the gears is 90 mm. Find the power that can be transmitted from the standpoint of strength. **07**

OR

- Q.3** (a) Define the following terms: **03**
(i) Helix Angle (ii) Circular Pitch (iii) Arc of contact.
(b) Derive the expression for beam strength of bevel gear. **04**
(c) A pair of helical gears are to transmit 15 kW. The teeth are 20° stub in diametral plane and helix angle of 45°. The pinion runs at 10 000 r.p.m. and has 80 mm 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 module and face width from static strength considerations and check the gears for wear, given $\sigma_{es} = 618$ MPa. **07**

- Q.4** (a) Why I section is more preferred for connecting rod? **03**
(b) Why do inlet and exhaust valves have conical heads and seats? **04**

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

OR

Q.4 (a) Explain the piston materials. **03**

(b) Explain Design Criteria of intake manifold and exhaust manifold. **04**

(c) Explain the working of valve gear mechanism for a given I.C. engine with neat sketch. **07**

Q.5 (a) What are the advantages and disadvantages of “Wet Liner” and “Dry Liner” in I.C. engines? **03**

(b) Explain design consideration of piston and selection of piston material in I C engine. **04**

(c) The conical valve of an 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 46 MPa. The valve is made of steel for which $k = 0.42$. The angle at which the valve disc seat is tapered is 30° . Determine: 1.Thickness of the valve head; 2.Stem diameter; and 3. maximum lift of the valve. **07**

OR

Q.5 (a) State the function of the following for an internal combustion engine piston: Piston rings , Piston skirt, Piston pin. **03**

(b) Sketch a valve gear mechanism, name different parts of the same and list materials of Valve and rocker arm. **04**

(c) Explain design procedure for connecting rod. **07**
