

GUJARAT TECHNOLOGICAL UNIVERSITY
BE – SEMESTER – VI (OLD).EXAMINATION – WINTER 2016

Subject Code: 160201**Date: 27/10/2016****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) State and explain design consideration of casting with figure. **07**
 (b) Explain selection of Engine layouts. **07**
- Q.2** (a) Explain “Wet Liner” and “Dry Liner” in I.C. engines? Explain cylinder design with material consideration. **07**
 (b) Explain types of rolling contact bearing. **07**
- OR**
- (b) Explain materials selection for gears and gear lubrication. **07**
- Q.3** (a) Explain terms used in Bevel Gears. **07**
 (b) What are the advantages of helical gears over spur gears? Explain different modes of gear teeth failures, stating their reasons and remedies. **07**
- OR**
- Q.3** (a) Explain the balancing of single and multi cylinder engine. **07**
 (b) A pair of straight teeth spur gears is to transmit 25 kW when the pinion rotates at 250 r.p.m. The velocity ratio is 1 : 3. The allowable static stresses for the pinion and gear materials are 120 MPa and 100 MPa respectively. The pinion has 15 teeth and its face width is 12 times the module. Determine : 1. module; 2. face width; and 3. pitch circle diameters of both the pinion and the gear from the standpoint of strength only, taking into consideration the effect of the dynamic loading. Assuming steady load condition. Service factor $C_s = 1$ The tooth form factor y can be taken as $Y = 0.154 - (0.912 / \text{no. of teeth})$ And the velocity factor $C_v = 3 / (3+v)$, where v is expressed in m/s. **07**
- Q.4** (a) Explain design considerations of gearbox. **07**
 (b) Explain types of worm gears & Efficiency of worm gears. **07**
- OR**
- Q.4** (a) Design a self-aligning ball bearing for a radial load of 7000 N and a thrust load of 2100 N. The desired life of the bearing is 160 millions of revolutions at 300 r.p.m. Assume uniform and steady load, a self-aligning ball bearing, the values of radial factor (X) and thrust factor (Y) for WA / WR = 0.3, are X = 0.65 and Y = 3.5, for uniform and steady load, the service factor KS for ball bearings is 1 The rotational factor (V) for most of the bearings is 1 **07**
 (b) Determine the beam strength and face width of helical gears, also explain the following 1) Helix angle 2) Axial pitch 3) Normal Pitch. **07**

- Q.5 (a)** What is the difference between centre and side crankshafts? Where do you use them? Name the materials for crankshaft. **07**
- (b)** A four stroke diesel engine has the following specifications : **07**
Brake power = 8 kW ; Speed = 1400 r.p.m. ;
Indicated mean effective pressure = 0.35 N / mm² ;
Mechanical efficiency=80 %; maximum pressure = 9 * mean effective pressure;
Assume length of the stroke in m =1.5 * bore of the cylinder in m
Allowable circumferential stress =42 MPa ;
Tensile stress for the material of the stude = 65 MPa;
Determine : 1. bore and length of the cylinder ; 2. thickness of the cylinder head ;
and 3. size of studs for the cylinder head.

OR

- Q.5 (a)** Write step by step design procedure for the design of connecting rod for an I.C. engine with design equations. Draw the sketch of connecting rod including small and big end bearings and bolts. **07**
- (b)** Explain manufacturing and assembly considerations in design. **07**
