

**FACULTY OF ENGINEERING**  
**B.E.3/4 (AE) II – Semester (Main) Examination, April / May 2014**

**Subject: Design of Automotive Components**

**Time: 3 Hours**

**Max.Marks: 75**

**Note: Answer all questions from Part A. Answer any five questions from Part B.**

**PART – A (25 Marks)**

- 1 What are the timing gears and timing chain? (3)
- 2 Sketch an engine valve and name its different parts. (3)
- 3 How is connecting rod usually made? (2)
- 4 Name the largest single part in the engine and list out the components attached to the crank shaft. (3)
- 5 Write some practical applications for the various types of springs. (3)
- 6 Explain spring rate and spring index terms of the spring. (3)
- 7 What type of bearing is used to engage and disengage the clutch? (2)
- 8 What is the material of the rollers in antifriction bearings? (2)
- 9 State any four advantages of gear drive over other types of drives. (2)
- 10 Which type of gear is used when the shafts are perpendicular to each other? (2)

**PART – B (50 Marks)**

- 11 (a) Sketch a piston and name its different parts. (3)  
 (b) Explain the following: (7)
  - i) Thickness of the cylinder wall
  - ii) Bore and length of the cylinder
  - iii) Cylinder flange and studs
  - iv) Cylinder head
- 12 (a) What are the forces acting on the connecting rod? (4)  
 (b) Discuss the design of connecting rod for an I.C. engine. (6)
- 13 Design a spring for a balance to measure 0 to 1000 N over a scale of length 80 mm. The spring is to be enclosed in a casing of 25 mm diameter. The approximate number of turns is 30. The modulus of rigidity is 85 kN/mm<sup>2</sup>. Also calculate the maximum shear stress induced. (10)
- 14 A Pinion rotating at 600 rpm 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. (10)
- 15 A full journal bearing of 50 mm diameter and 100 mm long has a bearing pressure of 1.4 N/mm<sup>2</sup>. The speed of the journal is 900 rpm and the ratio of journal diameter to the diametral clearance is 1000. The bearing is lubricated with oil whose absolute viscosity at the operating temperature of 75°C may be taken as 0.011 kg/m-s. The room temperature is 35°C. Find (10)
  - i) The amount of artificial cooling required and
  - ii) The mass of the lubricating oil required, if the difference between the outlet and inlet temperature of the oil is 10°C. Take specific heat of the oil as 1850 J/Kg°C.
- 16 A single row angular contact ball bearing number 310 is used for an axial flow compressor. The bearing is to carry a radial load of 2500 N and an axial or thrust load of 1500 N. Assuming light shock (10)
- 17 (a) Sketch a valve gear mechanism of an internal combustion engine and label its various parts. (5)  
 (b) Explain what you understand by A.M. Wahl's factor and state its importance in the design of helical springs? (5)