

College of Engineering, Pune
S.Y. M. Tech. (Automotive Technology)
ESE – November 2013
Course Name: Automotive Design

Maximum Marks: 60

Duration : 03.00 Hr.

Instructions:

Attempt all questions.

Make suitable assumptions, if necessary.

All questions carry equal marks.

Q.1 Attempt any two questions.

- a) How does the combustion chamber design affect volumetric efficiency of i. c. engine ? (6)
- b) What major changes in engine construction and engine performance are expected if flat cylinder head of s. i. engine is changed to hemispherical cylinder head ? (6)
- c) Why it is possible to use too lean or too rich mixture in c.i. engine but not in s.i. engine ? (6)

Q.2 Attempt any two questions.

- a) What are the criteria for deciding compression ring thickness ? (6)
- b) How does the clearance between piston and cylinder wall vary along the piston length ? (6)
- c) How does the piston crown shape change with flat cylinder head of s.i. engine, hemispherical cylinder head of s.i. engine, direct injection c.i. engine and indirect injection c.i. engine ? (6)

Q.3 Attempt any two questions.

- a) What is the effect of connecting rod length on overall engine design ? (6)
- b) How connecting rod can be subjected to torsional vibrations ? (6)
- c) What are the criteria for deciding crankpins' relative angular positions of i.c. engine crank shaft ? (6)

Q.4 Find appropriate reduction ratios and number of teeth on clutch shaft gear, main shaft gears and lay shaft gears of the gear box for the following vehicle having maximum speed of 150 km/hr, assuming helical teeth on all gears with normal module = 2.5 mm.

Vehicle weight = 9 kN

Rolling resistance coefficient = 0.015

Wheel rolling radius = 28 cm

Maximum gradient = 25 %

Engine develops its rated power at 5000 r.p.m. and maximum torque of 60 N.m at 3000 r.p.m. Assume shaft centre distance = 6 cm. (12)

Q.5 Attempt any two questions.

- a) What will be the effect on vehicle performance if clutch torque transmitting capacity is too high or too low ? (6)
- b) How to find the braking torque required at front wheels and rear wheels of a car for minimum stopping distance ? (6)
- c) What is the effect of valve lift on engine performance and engine design of automobile engine ? (6)