



FACULTY: ENGINEERING
SECOND SEMESTER EXAMINATIONS (JULY 2016)
2015/2016 ACADEMIC SESSION

HOD'S SIGNATURE

COURSE CODE: ATE 302
COURSE TITLE: AUTOMOTIVE COMBUSTION, POWER TRAIN & NVR
DURATION: 1 HOUR 30MINS

INSTRUCTIONS

1. ATTEMPT ANY 4 QUESTIONS
2. BOLD AND LEGIBLE WRITING WILL BE REWARDED

QUESTION ONE (1)

- a) Explain why Internal Combustion Engine (ICE) is regarded as a heat engine (2 marks)
- b) Compare to steam engine, enumerate three (3) benefits of ICE (3 marks)
- c) Define the following types of engines: - (i) Spark Ignition (ii) Compression Ignition (4 marks)
- d) Make the comparative analysis of spark and compression engines using the following criteria (i) Cost (ii) Safety (iii) Pollution (iv) Torque (6 marks)

QUESTION TWO (2)

- a) Define the following terms as far as regards ICE (i) Top Dead Centre (ii) Bottom Dead Centre. Hence, sketch a neat diagram to illustrate these 2 terms (4 marks)
- b) With the aid of diagram, define the following terms:- (i) Bore of a Cylinder (ii) Stroke of a cylinder (3 marks)
- c) What is a Compression Ratio? Hence, explain why it is not advisable to use too much a high Compression Ratio. Give the normal (recommended) range of compression ratio (4 marks)
- d) (i) Define the term Firing Order and explain why the concept is introduced in engine design.(ii) Give 2 likely firing orders for a 6-cylinder engine (4 marks)

QUESTION THREE (3)

- a) What is the main function of piston rings? (2 marks)
- b) There are usually two sets of piston rings. Mention them and give their specific functions (4 marks)
- c) Mention 4 merits of a two-stroke engine over its four-stroke engine. Hence 2 demerits of the former over the latter (6 marks)
- d) Mention 3 major criteria that necessitate application two-stroke engines (3 marks)

QUESTION FOUR (4)

- a) State the difference between the spur and helical gears. Which one is better? Give two reasons for your choice (5 marks)
- b) Give 3 reasons for incorporation of gearbox in automobiles. Suggest 2 reasons why manual gearbox is still in use (4 marks)
- c) State the main purpose of an idler gear. Why is the gear box so named? Illustrate the action of an idler gear with a neat diagram (4 marks)
- d) Mention 2 advantages constant mesh gearbox over its sliding mesh counterpart (2 marks)

QUESTION FIVE (5)

- a) State the main function of clutch mechanism in automobiles (2 marks)
- b) Mention 2 components that constitute Differential Assembly. State the function of each and explain why each component is so named (6 marks)
- c) Enumerate maintenance procedures for the following sub-components:- (i) Gearbox (ii) Clutch (iii) Differential Assembly. Mention 2 likely manual transmission oils (5 marks)
- d) Fully automatic vehicle does not after all exist. Discuss briefly (2 marks)