

FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA
SCHOOL OF SCIENCE AND TECHNOLOGY EDUCATION
DEPARTMENT OF INDUSTRIAL AND TECHNOLOGY EDUCATION

FIRST SEMESTER EXAMINATION, 2019/2020 ACADEMIC SESSION

COURSE CODE : ITE 212

COURSE TITLE : AUTOMOBILE ENGINES

TIME : 2 Hours

INSTRUCTION: Answer Question ONE and any other THREE Questions.

- 1a. With the aid of simple sketches, differentiate between camshaft and crankshaft used in automobile engines. (4 Marks)
- 1b. Show in Tabular form, the sequence of the various events that occurs in an inline 4-cylinder engine having firing order of 1 - 3 - 4 - 2 . (4 Marks)
- 1c. With respect to the principle of operation, differentiate between the Clerk engine and Otto engine if petrol is the fuel used. (10 Marks)
- 1d. A motor vehicle engine has a bore of 90 mm, stroke of 85 mm and compression ratio of 8.5. The engine is rebored to 2 mm oversize. Calculate: (i) Original capacity of the engine (ii) Percentage increase in capacity due to reboring (iii) Compression ratio after reboring. (9 Marks)

- 2a. With the aid of neat labeled diagrams and examples, differentiate between reciprocating engines and rotary engines. (4 Marks)
- 2b. Produce a neat labeled diagram of the series system of hybrid car. (3 Marks)
- 2c. If the bore of an eight cylinder square engine is 5cm and swept volume is 1650cm^3 , calculate the engine capacity. (4 marks)..

- 3a. Briefly explain the following terms as it relates to automobile engines: (i)Cycle of operation (ii)Scavenging (iii)Firing Order (iv)Fresh Charge (4 Marks)
- 3b. Outline any four performance requirements of the engine flywheel used in motor vehicles. (4 Marks)
- 3c. Calculate the piston displacement for an eight cylinder square engine, if the side of the square is 7cm . (3 Marks)

- 4a. Outline any Four (4) desirable characteristics a piston should posses. (4 Marks)
- 4b. Produce a neat labeled sketch of an automobile piston and show the grooves for the various piston rings and their names. (4 Marks)
- 4c. If the bore of a 16 cylinder square engine is 5cm and the swept volume is in cm^3 , calculate the stroke. (3 Marks)

- 5a. Outline three (3) possible causes of overheating in an engine. (3 Marks)
- 5b. Produce a neat label sketch of a typical single cylinder engine showing the following parts: (i)Piston (ii)Connecting rod (iii) Crank (iv) Crankshaft (v) Main bearing. (5 Marks)
- 5c. A six cylinder engine has a swept volume of 300 cm^3 . If the compression ratio is 8.5: 1, calculate (i) the clearance volume (ii) the engine capacity. (3 Marks)

- 6a. Define volumetric efficiency, state why the volumetric efficiency for two stoke engine is low. (4 Marks)
- 6b. Produce a neat sketch of the oil sump and state the reason for incorporating baffle plates and drain plug in the oil sump. (5 Marks)
- 6c. Differentiate between pre-ignition and detonation in relation to automobile engines. (2 Marks).