



Study Programme	: Bachelor of Science (Honors) in Engineering
Name of the Examination	: Final Examination
Course Code and Title	: DMX 4208 Automobile Technology
Academic Year	: 2022-2023
Date	: 20 th February 2024
Time	: 1330-1630 hrs
Duration	: 3 hours

General instructions

1. Read all instructions carefully before answering the questions.
2. This question paper consists of five (05) questions. All questions carry equal marks.
3. **Answer all five (05) questions.**

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- Q1). a). Name five major components of a forced liquid-cooled engine cooling system. (5 Marks)
- b). Explain two advantages of an electrically operated radiator cooling fan compared to a mechanically driven fan. (5 Marks)
- c). Briefly explain how a damaged head gasket can affect the engine cooling system's performance. (5 Marks)
- d). With aid of a sketch, briefly explain the function of a coolant recovery system used in an automobile engine. (5 Marks)
- Q2). a). With aid of a neat sketch (engine parts and flow of lubrication), illustrate the operation of the forced lubricating system in an automobile engine. (5 Marks)
- b). What are engine oil additives and explain three types of additives along with their function. (5 Marks)
- c). Briefly explain why a separate oil reservoir is not used in small petrol two-stroke engine. (5 Marks)

- d). The Figure 1 illustrates the variation in viscosities of a single grade engine oil and multi grade engine oil with respect to temperature.

Explain, how the improvement in viscosity of multi grade oil enhances engine performance and protection in low and high temperatures when compared to a single grade oil.

(5 Marks)

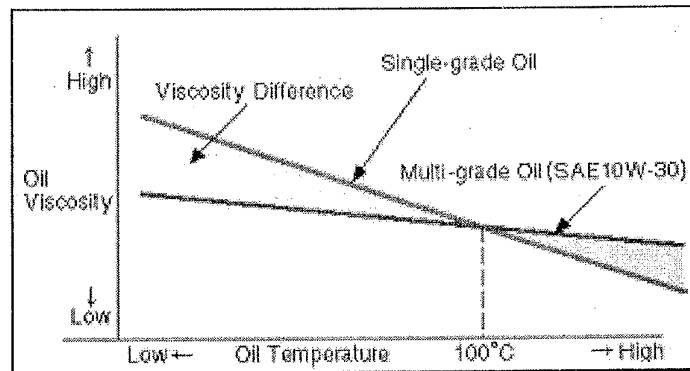


Figure 1 Viscosity Variation of Engine Oils in Low and High Temperatures

- Q3). a). Briefly explain the effects on the driver, passengers, and vehicle components, if the engine is rigidly mounting to its frame in an automobile. (5 Marks)
- b). Briefly describe three functions of the piston rings used in an internal combustion engine. (5 Marks)
- c). During the rope brake dynamometer test on a four stroke, single cylinder, Liquid- Pressurized Gas (LPG) engine. The following observations are made.

Liquid gas consumption	-	4.5 l/hr
Speed of the engine	-	800 rev/min
Effective brake diameter	-	0.9 m
Dead weight on brake	-	400 N
Spring balance reading	-	40 N

Consider the following data for the test,

Calorific value of LPG	-	32300 kJ/l
Density of the liquid gas	-	0.56 kg/l
Indicated mean effective pressure	-	395 kN/m ²
Cylinder bore diameter	-	165 mm
Piston stroke length	-	305 mm

Determine the following for the engine.

- a) Brake power. (2.5 Marks)
 - b) Mechanical efficiency. (2.5 Marks)
 - c) Indicated thermal efficiency. (2.5 Marks)
 - d) Brake thermal efficiency. (2.5 Marks)
- Q4).
- a). Draw a circuit diagram of a basic ignition system and label five salient parts. (5 Marks)
 - b). Name the two types of advancing mechanisms used in a conventional distributor and describe their functions. (5 Marks)
 - c). With a neat sketch of a variable venturi carburetor, explaining how it controls air-fuel mixture for high and low engine loads. (5 Marks)
 - d). Briefly, explain four ways Hydrocarbons (raw unburnt fuel) are emitted from the automobile. (5 Marks)
- Q5). Write short notes on the following topics
- a). Operation of the Direct Vacuum Servo Mechanism. (5 Marks)
 - b). A comparison of Independent Suspension System over a Non-Independent Suspension system. (5 Marks)
 - c). Parts and Operation of the Rack arm and pinion steering system. (5 Marks)
 - d). The parts of the Wankel engine and it's operation compared to a reciprocating gasoline engine. (5 Marks)