



Name :

Roll No. :

Invigilator's Signature :

CS/B.TECH /AUE(O)/SEM-5/AUE-502/2012-13

2012

AUTOMOTIVE DIESEL ENGINE

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : $10 \times 1 = 10$
 - i) The class of hydrocarbon fossil fuels is best suited for use as a fuel in diesel engines.
 - a) olefinic
 - b) parafinic
 - c) naphthene
 - d) aromatic.
 - ii) Cetane
 - a) has zero cetane number
 - b) has 85 cetane number
 - c) has 100 cetane number
 - d) has 15 cetane number.
 - iii) For the same temperature limits and heat input the most efficient cycle is
 - a) Carnot cycle
 - b) Diesel cycle
 - c) Otto cycle
 - d) Dual cycle.
 - iv) The ignition temperature of diesel fuel is about
 - a) 400°C
 - b) 300°C
 - c) 600°C
 - d) 800°C .



- v) For diesel engines, the method of governing employed
 - a) Quality governing
 - b) Quantity governing
 - c) Hit and miss governing
 - d) both (a) and (b).
- vi) If the temperature of supply air to an IC engine increase, its efficiency
 - a) increase
 - b) decrease
 - c) does not change
 - d) may increase or decrease depending on other factors.
- vii) A diesel engine is usually more efficient than a spark ignition engine because
 - a) diesel being a heavier hydrocarbon, releases more heat per kg than gasoline
 - b) the air standard efficiency of diesel cycle is higher than the Otto cycle, at a fixed compression ratio
 - c) the compression ratio of a diesel engine is higher than that of an SI engine
 - d) self ignition temperature of diesel is higher than that of gasoline.
- viii) The delay period in diesel engine depends upon which of the following ?
 - a) Temperature and pressure in the cylinder at the time of injection
 - b) Nature of the fuel mixture strength
 - c) Relative velocity between the fuel injection and air turbulence pressure of residual gases
 - d) All of these.



- ix) The knocking tendency in compression ignition engines increases with
- increase of coolant water temperature
 - increase of temperature of inlet air
 - decrease of compression ratio
 - increase of compression ratio.
- x) In the operation of four-stroke diesel engines, the term 'squish' refers to the
- injection of fuel in the pre-combustion chamber
 - discharge of gases from pre-combustion chamber
 - entry of air into the combustion chamber
 - stripping of fuel from the core.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following $3 \times 5 = 15$

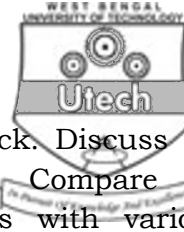
- Compare the thermal efficiency between Otto, Diesel and Dual cycle with proper $P-V$ and $T-S$ diagram when compression ratio and heat input is same for all the cycle.
- What are the differences in abnormal combustion between SI and CI engines ?
- Explain the stages of combustion in a CI engine with $p-\theta$ diagram and show different important points in the diagram.
- Discuss the important properties of a CI engine fuels.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

- Discuss various types of super charger.
 - What are the limitations of a turbocharger ?
 - Explain with a neat sketch the principle of exhaust turbocharging of a single-cylinder engine. $5 + 3 + 7$



7. a) Explain the phenomenon of diesel knock. Discuss the methods of controlling diesel knock. Compare the knocking between CI and SI engines with various variables.
- b) What are the main three air motion principles taken into consideration in the design of a diesel engine ? Define swirl ratio. 10 + 5
8. a) Explain with neat sketches, the typical forms of direct and indirect combustion chambers employed in CI engines highlighting the design objectives, their advantages and disadvantages respectively.
- b) What are the advantages of supercharging ? 10 + 5
9. a) What is ignition delay ? Explain briefly about the different features affecting the delay period.
- b) Draw a line diagram of a CI engine fuel supply system and showing all the components.
- c) What are the general functions of a governor used in CI engine ?
- d) Write the names of major components of a fuel injector.

7 + 3 + 3 + 2

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