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Reg. No. :

Question Paper Code : 91007

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.

Fifth/Seventh Semester

Aeronautical Engineering

OAT 552 — INTERNAL COMBUSTION ENGINES

(Common to : Aerospace Engineering/Industrial Engineering/Industrial Engineering and Management/Manufacturing Engineering/Marine Engineering/
Material Science and Engineering/Mechanical Engineering/
Mechanical Engineering (Sandwich)/Mechanical and Automation
Engineering/Mechatronics Engineering/Production Engineering/
Robotics and Automation/Safety and Fire Engineering)

(Regulations 2017)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define Octane number of any fuel.
2. Write any four differences between SI and CI engines.
3. How does knock occur in Petrol engines?
4. What is mal distribution in Carbureted Engines?
5. Write any four spray characteristics of a diesel spray.
6. What is boost pressure in TC diesel engines?
7. Write any four important properties of engine coolants.
8. What is meant by mist lubrication?
9. What is a fuel cell and how does it differ from a battery?
10. Write any four drawbacks of HCCI Engines.

PART B — (5 × 13 = 65 marks)

11. (a) (i) Discuss the construction and working principle of a 2 stroke spark ignition engine with suitable diagram(s). (7)
- (ii) Derive the air standard efficiency of an Otto cycle. (6)

Or

- (b) (i) Write a detailed study on the properties of fuels to be used for IC Engines. (10)
- (ii) Write short notes on materials for engine components. (3)
12. (a) Discuss in detail the acceleration pump and economizer systems of a modern carburetor with suitable sketches.

Or

- (b) What is Petrol injection? Why is it preferred in modern engines? Write in detail the components and working principle of a modern MPFI system with a suitable sketch.

13. (a) (i) Write a detailed study on the use of different direction injection combustion chambers for diesel engines with suitable diagrams. (9)
- (ii) Discuss the important factors to be considered for designing the combustion chambers of a diesel engine. (4)

Or

- (b) (i) Discuss the stages of combustion in diesel engine with a pressure crank angle diagram.
- (ii) Explain the knocking phenomenon of diesel engine.
14. (a) Why is cooling system necessary for an engine? Discuss in detail the components and working function of a forced circulation cooling system of an IC engine with a suitable diagram.

Or

- (b) Write the important properties of a lubricant to be used in IC engines. Discuss in detail the working principle of a wet sump lubricating system of an IC engine with a suitable sketch.

15. (a) (i) Write the important configurations of hybrid vehicles. (3)
- (ii) Explain the components of a parallel hybrid vehicle and describe the complete functioning of it with a neat sketch. (10)

Or

- (b) Write short notes on the following :
- (i) Homogeneous Charge Compression Ignition Engines (7)
- (ii) Variable Compression Ratio Engines. (6)

PART C — (1 × 15 = 15 marks)

16. (a) What is Gasoline Direct Injection? Discuss in detail the construction and working of modern GDI system of an automobile. What are the drawbacks of it over conventional carburetion system?

Or

- (b) Write the important requirements of a FIS of a diesel engine and explain in detail the components, working principle and functioning of a common rail direct injection system of a modern diesel engine with a suitable diagram.

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