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**Question Paper Code : 40978**

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2021.

Fifth/Seventh Semester

Aeronautical Engineering

OAT 552 — INTERNAL COMBUSTION ENGINES

(Common to Aerospace Engineering Industrial Engineering/Industrial Engineering and Management/Materials Science and Engineering/Mechanical Engineering/Robotics and Automation Engineering/Manufacturing Engineering/Marine Engineering/Mechanical and Automation Engineering/Mechatronics Engineering/Production Engineering/Mechanical Engineering (Sandwich)

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. List at least four differences between two stroke and four stroke IC engines.
2. What is the significance of Cetane number in the combustion process observed in CI engines?
3. How the jet size and venturi size are determined for a carburettor used in SI engines?
4. State any four important types or shapes of combustion chambers common in SI engines.
5. Write short note on different types of nozzle in Diesel fuel Injection Systems
6. What do you understand by turbocharging? Why SI engines are not usually turbocharged?
7. What are the various operations involved in the liquid cooling system of an IC engine.
8. List the functions of an IC engine lubricating system.

9. What are the technology behind the gasoline direct injection engine?
10. List the types of batteries and fuel cells used in Electric vehicles.

PART B — (5 × 13 = 65 marks)

11. (a) List the assumptions involved in the air-standard cycles and using the T-S and P-V diagrams explain the various processes involved the air standard cycle for a petrol engine.

Or

- (b) List the main components of an Automobile engine and explain the functions of each component, materials and manufacturing methods used to make them.
12. (a) Explain the principal differences between the fixed and variable jet carburettors. Why does the mixture strength become richer with increasing flow rate in a simple carburettor?

Or

- (b) What are the basic requirements of good SI engine combustion chambers? Explain I-head combustion chamber with a neat sketch.
13. (a) Explain the spray structure of the diesel fuel. Describe the effects of spray structure and spray penetration in CI engine combustion?

Or

- (b) Explain the advantages of turbocharging in CI engine. Also sketch any four types of turbochargers used and explain the arrangement.
14. (a) List the various components of an oil lubricating system used in IC engines and explain the function of each component in the system.

Or

- (b) List the various types of oil lubricating systems used in IC engines. Among them explain the differences between a wet and dry sump lubrication system.
15. (a) Explain the working principle of variable compression ratio engine with neat diagram. How does the performance of a variable compression ratio engine is compared with that of a conventional constant compression ratio engine?

Or

- (b) Explain the working principle of a fuel cell with neat sketch. Also discuss advantages and challenges for the fuel cell vehicles.

PART C — (1 × 15 = 15 marks)

16. (a) (i) Which engine is more suitable for super charging - SI engine or CI engine? Under what circumstances might a super charger be appropriate? (7.5)
- (ii) Why do turbochargers most commonly use radial flow compressors and turbines with non-constant pressure supply to the turbine? (7.5)

Or

- (b) Briefly explain the construction and working principle of E-Turbo charger with suitable neat sketches.
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