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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Eighth Semester, B.E. - Automobile Engineering

Semester End Examination; May/June - 2018

Advanced IC Engines

Time: 3 hrs

Max. Marks: 100

Note: i) Answer **FIVE** full questions, selecting **ONE** full question from each unit.

ii) Assume suitably missing data if any.

UNIT - I

- 1 a. With the help of neat sketches, explain intake jet flow process in SI engines. 8
- b. Explain the following with neat sketches :
- (i) Swirl measurement
- (ii) Mean velocity and turbulence characteristics 12
- (iii) Crevice flows and blowby
- 2 a. Describe with neat sketches the working of Wankel engine. 7
- b. Explain the working of free piston engine, with a schematic diagram. 7
- c. What are the limitations and advantages of variable compression ratio engine? 6

UNIT - II

- 3 a. With the help of neat sketch, describe the thermodynamic analysis of SI engine combustion. 10
- b. Explain the flame structure and speed with the help of $P-\theta$ diagram. 10
- 4 a. Discuss the causes of the following in SI engine :
- (i) Cycle-by-Cycle 10
- (ii) Cylinder-to-Cylinder
- b. Describe the phenomenon of detonation in SI engine and list the factors affecting the detonation. 10

UNIT - III

- 5 a. Explain the important consequences of combustion process on CI engine operations. 5
- b. Explain the photographic studies of engine combustion. 5
- c. With neat sketch, explain the direct injection system and indirect injection system in CI system. 10
- 6 a. Draw a typical heat release diagram of diesel engine and discuss its salient points. 10
- b. Write a note on atomization and fuel spray penetration in a CI engine fuel injection system. 10

UNIT - IV

- 7 a. Explain briefly the importance of heat transfer. 5
- b. Explain intake and exhaust system heat transfer. 5
- c. With the help of suitable diagram, explain the energy flow diagram for IC engine. 10

- 8 a. With suitable diagram, describe the measurements of instantaneous heat transfer rates for diesel engine measurements. 10
- b. Explain briefly unburned mixture charts and burnt mixture charts with assumptions made for both. 10

UNIT - V

- 9 a. Explain briefly the purpose and classification of models. 6
- b. Explain different types of models for calculating details of intake and exhaust flows. 10
- c. Explain gas dynamic models. 4
- 10 a. With suitable diagram, explain the thermodynamic based in-cylinder models for CI engines. 10
- b. Explain with neat block diagram of thermodynamic based in-cylinder models for SI engines. 10

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