



## 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; June - 2017**

**Advanced IC Engines**

Time: 3 hrs

Max. Marks: 100

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

### UNIT - I

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|------|--|----|
| 1 a. | Explain with neat sketch, the radial and axial velocity components during the intake jet flow process. | 10 |
|      | b. Discuss briefly the velocity and mass flow rate of prechamber engine flows.                         | 10 |
| 2 a. | Discuss briefly the stratification of GDI engine.  | 10 |
|      | b. Discuss briefly the recent developments in IC engine.   | 10 |

### UNIT - II

- |      |  |    |
|------|--|----|
| 3 a. | Discuss briefly the essential features of combustion process in SI engine.         | 8  |
|      | b. Explain briefly the characterization of combustion process in SI engine.        | 12 |
| 4 a. | Explain the factors influencing the causes of cycle-by-cycle combustion variation. | 10 |
|      | b. What are the fuel factors that the tendency of knock depends? Explain briefly.  | 10 |

### UNIT - III

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|------|--|----|
| 5 a. | Describe briefly with neat sketches, the different types of diesel combustion systems. | 12 |
|      | b. Explain with the help of P-Q diagram, the combustion in DI diesel engine.           | 8  |
| 6 a. | What are the physical factors affecting the delay period? Discuss briefly.             | 8  |
|      | b. Discuss the following with respect to combustion in CI engines :                    | 12 |
|      | i) Spray penetration      ii) Droplet size      iii) Spray evaporation.                |    |

### UNIT - IV

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|------|---|----|
| 7 a. | Describe briefly the importance of different modes of heat transfer.  | 9  |
|      | b. Discuss briefly the dimensional analysis of convective heat transfer.  | 11 |
| 8 a. | Discuss the characteristics of instantaneous heat transfer rates in diesel engine.                                  | 8  |
|      | b. Discuss briefly the temperature and heat flux distribution in the cylinder liner of high speed DI diesel engine. | 12 |

### UNIT - V

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|-------|--|----|
| 9 a.  | What is the purpose and classification of engine flow models in combustion process.  | 8  |
|       | b. Discuss the mathematical governing equations for conservation of mass and conservation of energy for open thermodynamic system. | 12 |
| 10 a. | Explain with block diagram, the thermodynamic based simulation of IC engine operating cycle.                                       | 12 |
|       | b. Discuss the principle components of fluid mechanic based multidimensional engine flow models.                                   | 8  |