

GUJARAT TECHNOLOGICAL UNIVERSITY
M. E. - SEMESTER – III • EXAMINATION – WINTER 2012

Subject code: 731101**Date: 30/12/2012****Subject Name: I. C. Engine modeling and simulation****Time: 10.30 am – 01.00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1 (a)** What do you mean by simulation of internal combustion engine? State advantages of computer simulation in concern with IC engine. **07**
- (b)** Define: **07**
- 1) Burned gas fraction
 - 2) Single zone modeling
 - 3) Premixed burning
- Q.2 (a)** Show the evaluation of spray elements? Explain each term. **07**
- (b)** Develop spray equation model. **07**
- OR**
- (b)** Classify and Explain different types of diesel combustion system **07**
- Q.3 (a)** What is turbulence modeling? State its types. **07**
- (b)** How does combustion air swirl affect spray penetration? **07**
- OR**
- Q.3 (a)** Explain various flow processes taken place in S.I. engine during running condition with suitable sketch. **07**
- (b)** Derive conservation of energy equations for all zones of combustion. Show progressive evolution of combustion zones. **07**
- Q.4 (a)** Carried out fuel-air cycle analysis for petrol engine considering gasoline as fuel. **07**
- (b)** What is probability density function? **07**
- OR**
- Q.4 (a)** Explain wall impingement phenomenon and its effect? **07**
- (b)** Develop wiebe heat release model? **07**
- Q.5 (a)** Explain purpose procedure of K- ϵ model? **07**
- (b)** What basic procedure you follow to generate, fluid mechanics based multidimensional model for engine processes. Which governing equations are required for this? **07**
- OR**
- Q.5 (a)** Considering internal combustion engine as open system, explain combustion efficiency and inefficiency. **07**
- (b)** What is the need of combustion modeling for IC engine? Classify it. **07**
