

**GUJARAT TECHNOLOGICAL UNIVERSITY****M. E. - SEMESTER – III • EXAMINATION – SUMMER • 2014****Subject code: 731101****Date: 03-06-2014****Subject Name: I. C. Engine Modeling and Simulation****Time: 02:30 pm - 05:00 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? Explain step-by-step approach for simulating Internal Combustion engine. **07**  
(b) Show basic steps of 3-D model and application of it. **07**
- Q.2** (a) Generate zero dimensional, single zone models for progressive combustion with burning rate concept **07**  
(b) Show the evaluation of spray elements? Explain each term. **07**
- OR**
- (b) Classify and Explain different types of diesel combustion system. **07**
- Q.3** (a) Considering internal combustion engine as open system, explain combustion efficiency and inefficiency **07**  
(b) Explain various flow processes taken place in S.I. engine during running condition with suitable sketch. **07**
- OR**
- Q.3** (a) What is turbulence modeling state its type. **07**  
(b) Develop wiebe heat release model. **07**
- Q.4** (a) Explain diesel fuel spray structure with its major parameter. **07**  
(b) Explain wall impingement phenomenon and its effect? **07**
- OR**
- Q.4** (a) Discuss importance of modeling in context to I C engine. **07**  
(b) Explain different impingement regimes and droplet transition condition with suitable diagram **07**
- Q.5** (a) How does combustion air swirl affect spray penetration? **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) Carried out fuel-air cycle analysis for petrol engine considering gasoline as fuel **07**  
(b) Define: 1. Zero dimensional modeling. 2. Single zone modeling. 3. Diffusive burning **07**

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