Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. Sem. – III - Examination –June- 2011

Subject code: 731101

Subject Name: I.C.Engine modeling and simulation

Date:03/06/2011 **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 is the aim of engine modeling? State the procedure followed to generate simple model for engine processes?	**07**
	(b)	What is the need of combustion modeling for IC engine? Classify it?	**07**
Q.2	**(a)**	Generate structure of thermodynamic based DI diesel combustion simulation? Also explain the flow chart for it.	**07**
	(b)	Explain thin spray and thick spray modeling concept. In what situation, such modeling concepts apply?	**07**
		OR	
	(b)	Define: 1) Zero dimensional modeling 2) Multi zone modeling 3) Burned gas fraction	**07**
Q.3	**(a)**	What do you mean by simulation of internal combustion engine? Show step by step approach for simulating Internal Combustion engine.	**07**
	(b)	How does combustion air swirl affect spray penetration?	**07**
		OR	
Q.3	**(a)**	State various heat release and heat transfer models for zero- dimensional diesel engine combustion. By wiebe heat release model show a- Heat release as a function of relative duration of combustion b- Heat release rate as a function of relative duration of combustion	**07**
	(b)	Generate zero dimensional, single zone models for progressive combustion with burning rate concept.	**07**
Q.4	**(a)**	Explain diesel fuel spray structure with its major parameter.	**07**
	(b)	Explain different impingement regimes and droplet transition condition with suitable diagram?	**07**
		OR	
Q.4	**(a)**	Considering internal combustion engine as open system, explain combustion efficiency and inefficiency.	**07**
	(b)	Explore the procedure for heat release analysis in direct injection CI engine?	**07**
Q.5	**(a)**	For what purpose K-ε model method is used? Show its basic steps.	**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 compression generated turbulence and its effect?	**07**

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