Seat No.: _____ Enrolment No._____

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: 1) Burned gas fraction 2) Single zone modeling 3) Premixed burning	**07**
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**

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