Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER– III • EXAMINATION – SUMMER 2015

Subject Code: 731101 **Date: 30/04/2015**

Subject Name: I.C.ENGINE MODELING AND SIMULATION

Time: 2:30 pm to 5:00 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)**	Explain importance of combustion processes modeling for research and development engineers	**07**
	(b)	Why turbulence modeling is important? Explain complexity involved in turbulence modeling and give classification of turbulence model	**07**
Q.2	**(a)**	For thermodynamics model, explain wall heat transfer in Single ï Zone Cylinder model	**07**
	(b)	Explain Wiebe combustion profile for heat release in thermodynamics model	**07**
		OR	
	(b)	Explain polygon-hyperbola combustion profile for heat release in thermodynamics model	**07**
Q.3	**(a)**	Explain Zero-dimensional burning rate function for phenomenological model	**07**
	(b)	Model spray penetration and air-fuel mixing for phenomenological model	**07**
		OR	
Q.3	**(a)**	Explain analytically spray geometry and mixture formation in phenomenological model	**07**
	(b)	Explain fuel atomization and droplet evaporation modeling for phenomenological model.	**07**
Q.4	**(a)**	Explain diesel fuel spray structure with itôs major parameter	**07**
	(b)	Explain two equation k-ε turbulence models also list advantages and disadvantages.	**07**
		OR	
Q.4	**(a)**	Explain different impingement regimes and droplet transition condition with suitable diagram	**07**
	(b)	Explain combustion efficiency and inefficiency, considering IC engine as closed system.	**07**
Q.5	**(a)**	Define: (1) Burning rate, (2) Diffusive burning and (3) Burned gas fraction	**07**
	(b)	Explain turbulent dispersion and diffusion in sprays	**07**
		OR	
Q.5	**(a)**	Define: (1) Zero dimensional modeling, (2) Multi zone modeling and (3) Quasi-dimensional (phenomenological) modeling	**07**
	(b)	Explain drop drag and deformation of droplet.	**07**

****