Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V(New) • EXAMINATION – WINTER 2016

Subject Code:2150104 **Date:22/11/2016**

Subject Name:Computational Fluid Dynamics II

Time:10:30 AM to 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.**

			MARKS
Q.1		**Short Questions**	**14**
	1	Why more storage is required in case of SIMPLE-R than SIMPLE?	
	2	Write full form of SIMPLE-R.	
	3	Why solving governing flow equations for Incompressible flow is difficult that Compressible flow?	
	4	How over corrected values of pressure can be control in SIMPLE?	
	5	State the disadvantages of 1st order Upwind Scheme.	
	6	Lesser computational efforts are required in SIMPLE than SIMPLE-R. True or False?	
	7	P' equation is used to correct velocities only in SIMPLE-R. True or False?	
	8	What do you mean by Descritization?	
	9	Define Boundary Condition.	
	10	What is Shock Layer?	
	11	How would you define Space Marching Scheme?	
	12	FEM is not very accurate as compared to FDM. True or False?	
	13	What do you mean by Computational Fluid Dynamics?	
	14	How would you define Convergence?	
Q.2	**(a)**	Why Multidimensionality makes the solution of flow equations difficult?	**03**
	(b)	Differentiate Uniform grid and Staggered grid.	**04**
	(c)	Which steps would you follow while solving a problem using SIMPLE method?	**07**
		OR	
	(c)	Derive governing flow equations for flow over a flat plate.	**07**
Q.3	**(a)**	State the need of Upwind Scheme.	**03**
	(b)	Compare Central difference schemes and Upwind Schemes.	**04**
	(c)	List out steps of SIMPLE-R algorithm.	**07**
		OR	
Q.3	**(a)**	Explain Crank Nicolson Scheme for the FVM for unsteady heat conduction problem.	**03**
	(b)	Solve FVM for steady one dimensional convection and diffusion problem.	**04**
	(c)	Solve Finite Volume Method for two dimensional diffusion problem.	**07**
Q.4	**(a)**	How Finite Volume Method Works? Explain in brief.	**03**
	(b)	Explain 1st order Upwind Scheme in detail.	**04**
	(c)	Compare the pros and Cons of SIMPLE, SIMPLE-R and SIMPLE-C.	**07**
		OR	
Q.4	**(a)**	Write advantages of Finite Volume Method.	**03**
	(b)	Write the difference between FDM and FVM.	**04**
	(c)	What do you mean by Boundary Condition? Explain in details.	**07**
Q.5	**(a)**	Calculate the step size for the case of flow over a flat plate.	**03**
	(b)	Explain Flow over a flat plate – The Physical Problem.	**04**
	(c)	Discuss PISO algorithm in detail.	**07**

OR

Q.5	**(a)**	Differentiate between FDM, FVM and FEM.	**03**
	(b)	Explain Flux Vector Splitting.	**04**
	(c)	Write a note on Beam and Warming Method.	**07**

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