

Name:	
Enrolment No:	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2018

Course : Grid Generation Techniques	Semester : I
Course Code: ASEG7023	
Programme : M.Tech CFD	
Time : 03 hrs.	Max. Marks: 100
Instructions : All questions are compulsory	

SECTION A

S. No.	Question	Marks	CO
Q 1	Explain the process of discretization and its significance.	4	CO1
Q 2	Define Metrics and Jacobians of the transformation.	4	CO1
Q 3	Define structured mesh. List down advantages and disadvantages of structured mesh	4	CO2
Q 4	Differentiate singly, doubly and multiply connected domains	4	CO3
Q 5	Emphasis on the significance of domain triangulation.	4	CO4

SECTION B

Q 6	Transform the following terms from physical plane (x,y) to computational plane (ξ,η) <ul style="list-style-type: none"> i. $\frac{\partial}{\partial x^2}$ ii. $\frac{\partial}{\partial y^2}$ iii. $\frac{\partial}{\partial x \partial y}$ 	10	CO1
Q 7	Discretize following equation: <ul style="list-style-type: none"> i. One Dimensional heat conduction equation ii. Continuity equation for incompressible flow 	10	CO1
Q 8	Analyze various polynomial interpolation technique for grid generation. OR Illustrate Hermite interpolation polynomial technique for grid generation.	10	CO3
Q 9	Formulate Elliptic and Laplace grid generation techniques.	10	CO3

SECTION-C

Q 10	Compare structure and unstructured grid. Write the advantages and disadvantages of structured and unstructured grid OR Summarize various grid generation techniques.	20	CO2
Q 11	Illustrate unstructured grid generation techniques.	20	CO4

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SECTION A

S. No.		Marks	CO
Q 1	Convert the following partial differential terms into approximate algebraic equation using Taylor's Series: i. $\delta^2/\delta x^2$ ii. $\delta^2/\delta x \delta y$	4	CO1
Q 2	Explain the process of transformation and its significance.	4	CO1
Q 3	Define unstructured mesh. List down advantages and disadvantages of unstructured mesh.	4	CO2
Q 4	Differentiate singly, doubly and multiply connected domains	4	CO3
Q 5	Emphasis on the significance of domain triangulation.	4	CO4

SECTION B

Q 6	Derive the relation between Metrics and Jacobians.	10	CO1
Q 7	Transform the Laplace's equation from physical plane (x,y) to computational plane (ξ,η).	10	CO1
Q 8	Analyze various polynomial interpolation technique for grid generation. OR Illustrate Hermite interpolation polynomial technique for grid generation.	10	CO3
Q 9	Formulate parabolic and hyperbolic grid generation techniques.	10	CO3

SECTION-C

Q 10	Explain following grid generation techniques in detail: i. Mapping ii. Octree/ Quadtree Method iii. Paving Method iv. Coppering/ Sweeping OR i. Explain various grid quality parameters ii. What are the desired output of good quality grid?	20	CO2
Q 11	Illustrate following methods: i. Advancing Front Method ii. Delaunay Triangulation	20	CO4

