

Name:	 UPES UNIVERSITY WITH A PURPOSE
Enrolment No:	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2019

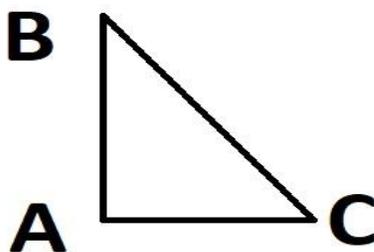
Course: Grid Generation Techniques Program: M.Tech CFD Course Code: ASEG7023 Instructions: All questions are compulsory. No. of pages: 02	Semester: I Time: 03 hrs. Max. Marks: 100
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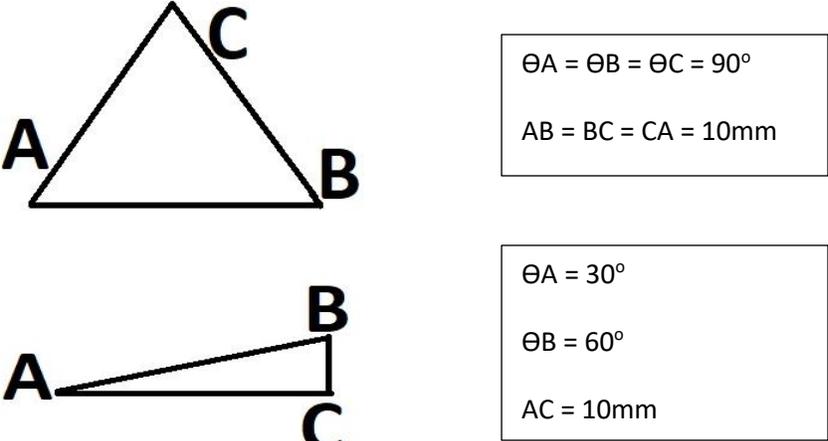
SECTION A

S. No.		Marks	CO
Q 1	Discuss the need of transformation of governing equations in CFD.	4	CO1
Q 2	Discretize second order wave equation.	4	CO1
Q 3	Explain the significance of sizing function.	4	CO2
Q 4	Emphasis on the advantage of cubic spline over other algebraic methods	4	CO3
Q 5	Summarize the concept of domain triangulation.	4	CO4

SECTION B

Q 6	<p>Transform the following terms from physical plane (x,y) to computational plane (ε,η)</p> <p style="margin-left: 40px;">i. $\frac{\partial}{\partial x}$</p> <p style="margin-left: 40px;">ii. $\frac{\partial}{\partial x^2}$</p> <p style="margin-left: 40px;">iii. $\frac{\partial}{\partial x \partial y}$</p> <p style="text-align: center;">OR</p> <p>Transform the Laplace equation from physical plane (x,y) to computational plane (ε,η)</p>	10	CO1
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Q 7	<p>Find out the quality parameter of the following elements. Which is best and worst out of the following. Justify your answer.</p> <div style="display: flex; align-items: center; justify-content: center;"> <div style="margin-right: 20px;"> <p style="font-size: 24px; font-weight: bold;">B</p>  <p style="font-size: 24px; font-weight: bold;">A</p> </div> <div style="border: 1px solid black; padding: 10px; margin-left: 20px;"> <p>∠A = 90°</p> <p>∠B = ∠C = 45°</p> <p>AB = BC = 10mm</p> </div> </div>	10	CO2
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	 <p style="text-align: center;"> $\theta A = \theta B = \theta C = 90^\circ$ $AB = BC = CA = 10\text{mm}$ </p> <p style="text-align: center;"> $\theta A = 30^\circ$ $\theta B = 60^\circ$ $AC = 10\text{mm}$ </p>		
Q 8	Explain the following grid generation techniques: <ol style="list-style-type: none"> i. Mapping ii. Sweeping 	10	CO2
Q 9	Differentiate between elliptical and hyperbolic grid generation techniques.	10	CO3
SECTION-C			
Q 10	Calculate the equation of the curve joining point (1,1), (2,2) by the application of Hermite interpolation method. <p style="text-align: center;">OR</p> Find out the equation of the curve joining point (0,0), (1,1), (2,8) and (3,27) by applying Lagrangian interpolation method.	20	CO3
Q 11	Formulate the process of advancing front method for the generation of unstructured grid.	20	CO4