SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY :: PUTTUR
(AUTONOMOUS)
(Approved by AICTE, New Delhi & Affiliated to JNTUA, Ananthapur)
(Accredited by NBA & Accredited by NAAC with 'A' Grade)
(An ISO 9001:2008 Certified Institution)
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QUESTION BANK

Subject with Code: Advanced Fluid Dynamics (19ME3102) Course & Branch: M. Tech(TE)
Year & Sem : I Year & I-Sem Regulation: R19

UNIT-I

1	Shortly discuss the following:		
	(i)	Fluids	2M
	(ii)	Fluid statistics	2M
	(iii)	Fluid dynamics	2M
	(iv)	Time line	2M
	(v)	Streak line	2M
	(vi)	Newtonian Fluids	2M
2	Describe the following:		
	(i)	Bernoulli's equation	3M
	(ii)	Three dimensional flow	3M
	(iii)	Laminar flow	2M
	(iv)	Viscous flow	2M
	(v)	Steady flow	2M
3	Outline the derivation of continuity equation by using integral and differential approach		12M
4	Discuss in detail about the derivation of momentum equation by using integral and differential approach		12M
5	Shortly discuss any three of the following:		
	(i)	Conservative body forces	3M
	(ii)	Euler equation	3M
	(iii)	Vorticity transport equation.	3M
	(iv)	Strokes equation	3M
6	Explain in detail about the boundary layer equation		12M

7	Explain about the parallel flow in straight channel with neat sketch.	12M
8	With a neat sketch describe the Coutte flow.	12M
9	Discuss in detail about the strokes flow past a sphere.	12M
10	Elucidate in detail about the strokes flow past a cylinder.	12M

UNIT-II

1	Prove Kelvin's theorem with the help of circulation piece wise continuous function and conservative body forces definitions.	12M
2	Discuss in detail about the irrotational flow.	12M
3	Outline the stream function / velocity potential approach.	12M
4	What are the application of empirical relation to various geometries for laminar and turbulent flows and explain in detail.	12M
5	Explain in detail about the Reynolds's Analogy.	12M
6	Describe in detail about the Colborn Analogy.	12M
7	Differentiate about the parallel flow and internal flow.	12M
8	Write in detail about the use of empirical correlations	12M
9	Discuss the various empirical equations available to predict natural convection heat transfer coefficient.	12M
10	With a simple sketch discuss the creeping flows.	12M

UNIT-III

1	a) Discuss in detail about the laminar flow.	6M
	b) Explain in detail about the laminar boundary layers.	6M
2	a) Provide the boundary layer equation.	3M
	b) Explain in detail about the boundary layer equation.	9M
3	Elucidate the mathematical anology of high Reynolds number flow near a solid boundary.	12M
4	Briefly explain the Blasius flow over a flat plate.	12M
5	a) Discuss shortly about the wall shear stress.	6M
	b) Discuss shortly about the boundary –layer thickness.	6M
6	Explain about the boundary layer with non-zero pressure gradient.	12M
7	Briefly discuss about the momentum integral equation for boundary layer.	12M
8	a) What is meant by separation of boundary layer?	3M
	b) With a neat sketch explain the separation of boundary layer.	9M

9	Elucidate the Karman – Pohlhausen method for flow over a flat plate.	12M
10	Briefly discuss about the Walz's approximation with neat sketch	12M

UNIT-IV

1	a) Define turbulent flow.	3M
	b) Explain the characteristics of turbulent flow.	9M
2	Explain briefly about the laminar turbulent transition.	12M
3	Derive the governing equation for turbulent flow.	12M
4	Derive the governing equation for shear stress models.	12M
5	Briefly explain about the time mean motion and fluctuations.	12M
6	Derive the governing equation for velocity distribution.	12M
7	Shortly discuss about the following:	
	(i) Time mean motion	3M
	(ii) Fluctuations	3M
	(iii) Turbulent flow	3M
	(iv) Velocity distribution	3M
8	Explain about the universal velocity profile on a flat plate and rectangular plate.	12M
9	Describe the universal velocity distribution for circular pipes and friction factor in detail.	12M
10	With suitable example brief about the Laminar – turbulent transition.	12M

UNIT-V

1	Describe the role of experiments in engineering with suitable examples.	12M
2	Discuss in detail about the layout of fluid flow experiments with suitable sketch.	12M
3	Discuss about the sources of error in measurements.	12M
4	Explain the importance of data analysis with some application.	12M
5	Discus the design of experiments with some suitable application.	12M
6	Discuss in detail about the review of probes and transducers	12M
7	Explain the function of hot wire anemometry with neat sketch.	12M
8	Describe the working principle of Laser Doppler Velocimetry with neat sketch.	12M
9	Explain the working principle of Particle Image Velocimetry with neat diagram.	12M
10	Describe the various significant properties of fluid.	12M