Course Code: 20ME3102 **R20**

SIDDHARTH GROUP OF INSTITUTIONS:: PUTTUR
(AUTONOMOUS)
Siddharth Nagar, Narayanavanam Road – 517583

QUESTION BANK (DESCRIPTIVE)

Subject with Code: ADVANCED FLUID DYNAMICS (20ME3102)

Course & Branch: M.Tech - TE

Regulation: R20

Year & Sem **:** I-M.Tech & I-Sem

UNIT –I
Governing equations in Fluid Dynamics

1	How would you explain the following: (i) Fluids (ii) Fluid statistics (iii) Fluid dynamics (iv) Time line (v) Streak line (ii) Newtonian Fluids	[L1][CO1]	**[12M]**
2	How would you describe the following: (i) Bernoulli's equation (ii) Three dimensional flow (iii) Laminar flow (iv) Viscous flow (v) Steady flow	[L1][CO1]	**[12M]**
3	Outline the derivation of continuity equation by using integral and differential approach	[L2][CO1]	**[12M]**
4	Discuss in detail about the derivation of momentum equation by using integral and differential approach	[L5][CO1]	**[12M]**
5	Elaborate three of the following: (i) Conservative body forces (ii) Euler equation (iii) Vorticity transport equation. (iv) Strokes equation	[L5][CO1]	**[12M]**
6	Explain in detail about the boundary layer equation	[L5][CO1]	**[12M]**
7	Explain about the parallel flow in straight channel with neat sketch.	[L5][CO1]	**[12M]**
8	How would you describe the Couette flow with a neat sketch?	[L1][CO1]	**[12M]**
9	Discuss in detail about the strokes flow past a sphere.	[L5][CO1]	**[12M]**
10	Outline in detail about the strokes flow past a cylinder.	[L2][CO1]	**[12M]**

UNIT –II
Potential Flow

1	Prove Kelvin's theorem with the help of circulation piece wise continuous function and conservative body forces definitions.	[L6][CO1]	**[12M]**
2	Discuss in detail about the irrotational flow.	[L5[CO1]	**[12M]**
3	Outline the stream function / velocity potential approach.	[L2][CO1]	**[12M]**

4	What are the application of empirical relation to various geometries for laminar and turbulent flows and explain in detail.	[L1][CO1]	**[12M]**
5	Outline in detail about the Reynolds's Analogy.	[L2][CO1]	**[12M]**
6	Outline in detail about the Colborn Analogy.	[L2][CO1]	**[12M]**
7	Compare the parallel flow and internal flow.	[L2][CO1]	**[12M]**
8	Write in detail about the use of empirical correlations	[L1][CO1]	**[12M]**
9	Prove the various empirical equations available to predict natural convection heat transfer coefficient.	[L6][CO1]	**[12M]**
10	With a simple sketch discuss the creeping flows.	[L5][CO1]	**[12M]**

UNIT –III

Laminar Boundary layers

1	Discuss in detail about the laminar flow.	[L5][CO1]	**[12M]**
2	Evaluate in detail about the laminar boundary layers.	[L6][CO1]	**[12M]**
3	Prove the boundary layer equation.	[L6][CO1]	**[12M]**
4	Explain in detail about the boundary layer equation.	[L1][CO1]	**[12M]**
5	Elucidate the mathematical anology of high Reynolds number flow near a solid boundary.	[L1][CO1]	**[12M]**
6	Briefly explain the Blasius flow over a flat plate.	[L1][CO1]	**[12M]**
7	Discuss shortly about the wall shear stress.	[L5][CO1]	**[12M]**
8	Discuss shortly about the boundary –layer thickness.	[L5][CO1]	**[12M]**
9	Explain about the boundary layer with non-zero pressure gradient.	[L1][CO1]	**[12M]**
10	How would you prove the momentum integral equation for boundary layer?	[L6][CO1]	**[12M]**

UNIT –IV

Turbulent Flow

1	a) Define turbulent flow. b) Explain the characteristics of turbulent flow.	[L1][CO1]	**[12M]**
2	Explain the characteristics of turbulent flow.	[L1][CO1]	**[12M]**
3	Explain briefly about the laminar turbulent transition.	[L1][CO1]	**[12M]**
4	Derive the governing equation for turbulent flow.	[L5][CO1]	**[12M]**
5	Derive the governing equation for shear stress models.	[L5][CO1]	**[12M]**
6	Briefly explain about the time mean motion and fluctuations.	[L1][CO1]	**[12M]**
7	Derive the governing equation for velocity distribution.	[L5][CO1]	**[12M]**
8	Shortly discuss about the following: (i) Time mean motion (ii) Fluctuations (iii) Turbulent flow (iv) Velocity distribution	[L5][CO1]	**[12M]**
9	Prove the universal velocity profile on a flat plate and rectangular plate.	[L6][CO1]	**[12M]**
10	Describe the universal velocity distribution for circular pipes and friction factor in detail.	[L5][CO1]	**[12M]**

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UNIT –V

Experimental Techniques

1	Evaluate the role of experiments in engineering with suitable examples.	[L6][CO1]	**[12M]**
2	Discuss in detail about the layout of fluid flow experiments with suitable sketch.	[L5][CO1]	**[12M]**
3	Discuss about the sources of error in measurements.	[L5][CO1]	**[12M]**
4	Explain the importance of data analysis with some application.	[L1][CO1]	**[12M]**
5	Discus the design of experiments with some suitable application.	[L5][CO1]	**[12M]**
6	Outline in detail about the review of probes and transducers	[L5][CO1]	**[12M]**
7	Explain the function of hot wire anemometry with neat sketch.	[L1][CO1]	**[12M]**
8	Describe the working principle of Laser Doppler Velocimetry with neat sketch.	[L1][CO1]	**[12M]**
9	Explain the working principle of Particle Image Velocimetry with neat diagram.	[L1][CO1]	**[12M]**
10	Describe the various significant properties of fluid.	[L1][CO1]	**[12M]**

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