Total number of printed pages = 2

19/2nd Sem/PCEW 2114

2022

TURBULENT FLUID FLOWS

Full Marks – 100

Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer *all* questions.

1. Write in details (draw the figure, if necessary) : 5×4=20

   (a) Bursting phenomena

   (b) Anisotropic turbulence

   (c) Dip phenomena

   (d) Energy cascade process.

2. (a) Write a short note on quadrant analysis. 10

   (b) Describe in details about Kolmogorov's –5/3-th power law. 10

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3. (a) Write in details about classification of flow field in open channels. 8

(b) Derive the mathematical expression for logarithmic law in wall shear layer. 12

4. (a) Write a detail note on Characteristics of boundary layer. 8

(b) Derive the governing equation of Prandtl's mixing length theory. 12

5. (a) Derive the mathematical expression for the Equation of Motion for viscous fluid flow *(Navier-Stokes Equation)*. 15

(b) Write a short note on Turbulent Kinetic Energy Budget. 5