*Total number of printed pages: 01* **PG/2nd/PCEW2114**

**2021**

# TURBULENT FLUID FLOW

*Full Marks: 60*

Time: Two hours

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

A. Write the answer of the following.

| | | | |
|---|---|---|---|
| 1. | a. | Write a short note on characteristics of boundary layer. | 5 |
| | b. | Derive the governing equation of motion for viscous fluid flow. | 5 |
| 2. | a. | Write in details about classification of flow field in open channels. | 5 |
| | b. | Derive the mathematical expression for logarithmic law in wall shear layer. | 10 |
| 3. | a. | Write a short note on quadrant analysis. | 5 |
| | b. | Describe in details about Kolmogorov's –5/3-th power law. | 5 |

B Write in details (*draw the figure, if necessary*). 5*5=25

1. Bursting phenomena
2. Anisotropic turbulence
3. Double averaging methodology
4. Dip phenomena
5. Energy cascade process

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