*Total number of printed pages: 02* **PG/2nd Semester/PCEW202**

**2023**

# HYDRAULICS OF SEDIMENT TRANSPORT

*Full Marks : 100*

Time : Three hours

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

*Answer **ALL** questions.*

**1.** Write in details in the following (*draw the necessary figure*): 5*4 = 20

a) Application of dimensional analysis

b) Mechanism for braid formation in rivers

c) Exner equation

d) Terminal fall velocity

**2.** a) Write a short notes on bed load transport. 6

b) Derive the governing equation for threshold condition for sediment motion for a given flow regime (Yang's model). Assume the necessary. 14

**3.** a) Write in details about hydraulically smooth and rough flow. 8

b) Derive the governing mathematical expression for turbulent logarithmic layer. Assume the necessary. 12

**4.** a) Find the expression for power ($P$), developed by a pump when $P$ depends upon the head ($H$), the discharge ($Q$), and specific weight ($\gamma$) of the fluid (use Rayleigh's method). 12

b) Discuss various types of bed forms (draw the necessary figures). 8

**5.** a) Discuss in details about method of selecting repeating variables in Buckingham's $\pi$ theorem. 8

b) Derive the 3D governing mathematical expression for Reynolds Averaged Navier-Stokes (RANS) equation. Assume the necessary. 12

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