

M.Sc.- II (Mathematics) (New CBCS Pattern) Semester-III
PSCMTH14A - Paper-III (Optional) - Fluid Dynamics - I

P. Pages : 2

Time : Three Hours



GUG/W/24/13758

Max. Marks : 100

- Notes : 1. Solve all the **five** questions.
2. Each question carries equal marks.

UNIT – I

1. a) Derive the equation of continuity. 10
b) State and prove Kelvin's circulation theorem. 10

OR

- c) Obtain : $\frac{d}{dt}(\log P) + \nabla \cdot \bar{q} = 0$. 10
d) Derive the Bernoulli's equation. 10

UNIT – II

2. a) State & prove Milne-Thomson circle theorem. 10
b) Discuss the velocity components at a uniform flow past a fixed infinite circular cylinder. 10

OR

- c) Discuss the flow due to a uniform line doublets at 0 of strength μ per unit length, its axis being along \overline{OX} . 10
d) State & prove theorem of Blasius. 10

UNIT – III

3. a) Obtain Maxwell's thermodynamic relations. 10
b) Find the profile $\phi(x, t)$ of a one-dimensional wave propagation if at $t = 0$. 10
 $\phi = F(x), \frac{\partial \phi}{\partial t} G(x)$.

OR

- c) Obtain two dimensional wave equation. 10
d) Discuss about stationary and progressive wave. 10

UNIT – IV

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| 4. | a) | Derive the equation of motion of a gas. | 10 |
| | b) | Describe Isentropic gas flow. | 10 |

OR

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| | c) | Discuss the reservoir discharge through a channel varying section. | 10 |
| | d) | Describe the investigation of maximum mass flow through a nozzle. | 10 |
| 5. | a) | Define stream lines and path lines. | 5 |
| | b) | Define sources, sinks & doublets. | 5 |
| | c) | Discuss the terms of Isothermal, Adiabatic and Isentropic processes. | 5 |
| | d) | Write a short note on shock waves. | 5 |
