Bernoulli's apparatus (closed water circuit)

KS/ME/BERNOULLIAPP

The apparatus is used to verify Bernoulli's Theorem. The system is closed circuit.

Utilities Required:

Electricity supply: Single Phase, 220 V AC, 50 Hz, 5-15m Amp. Combined socket with earth connection. Earth voltage shall be less than 5 volts.

Water Supply: Initial fill only (closed water circuit)

Floor Drain.

Floor Area: 1.5 x 0.75 m.

Technical Details:

Test Section : Convergent and Divergent section, Material Acrylic.

Piezometer Tubes : Material P.U. Tubes (at least 7 Nos.)

Water Circulation : ½ HP Pump

Flow Measurement: Using Measuring Tank with Piezometer, minimum capacity 25 Ltrs.

Sump Tank : Minimum capacity 70 Ltrs.

Inlet Tank : Minimum capacity 20 Ltrs. with fixed overflow arrangement.

Stop Watch: Electronic.

Control Panel Comprises of: Standard make On/Off Switch, Mains Indicator, etc.

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Kalpana Scientific Pvt.Ltd.
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Tel. 7679774297 website: www.kalpanascientific.com
Email id : kalpanascientifickolkata@gmail.com

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Bernoulli's apparatus (closed water circuit)

KS/ME/BERNOULLIAPP

Tanks shall be made of Stainless Steel.
The whole set-up shall be well designed and arranged on a rigid structure painted with industrial PU Paint.

Experimental Capability:
To verify the Bernoulli's Theorem experimentally.
To plot the Total energy vs distance

To verify the Bernoulli's Theorem experimentally.
To plot the Total energy vs distance

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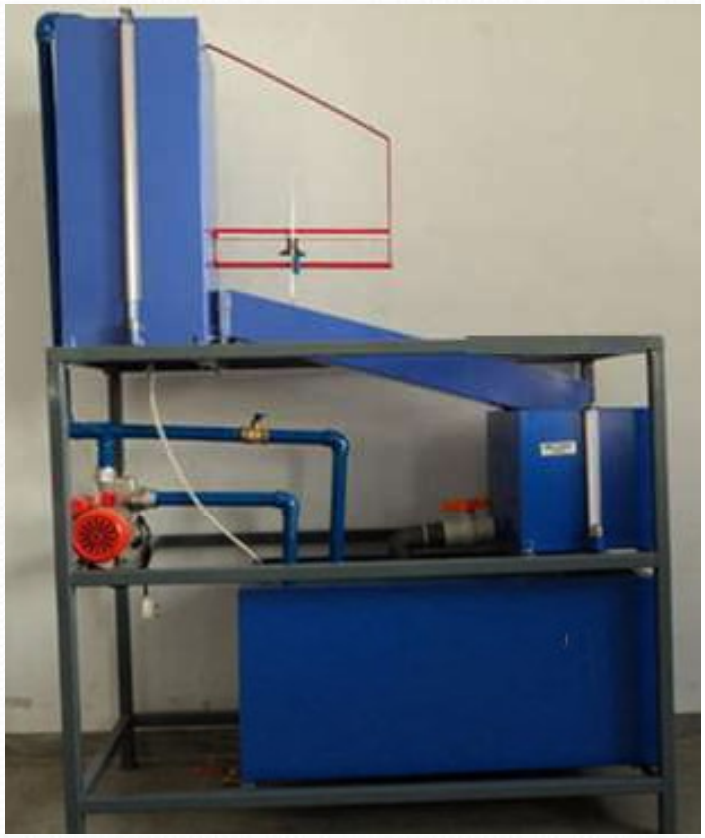
Orifice & Mouthpiece Apparatus (closed water circuit)

KS/ME/ORIFIC&MOUTHP

This apparatus is used to determine the coefficient of discharge (Cd), Coefficient of velocity (Cv) and Coeflicient of contraction (Cc) of different types of orifice. The system is closed circuit.



Utilities Required:
Electricity supply: Single Phase, 220 V AC, 50 Hz, 5-15m Amp. Combined socket with earth connection. Earth voltage should be less than 5 volts.
Water Supply: Initial fill only (closed water circuit) Floor Drain.
Floor Arca: 1.5 x 0.75 m.

Technical Details:
Set of Orifices: Material Acrylic. Dia 10 mm and 15 mm. 1no. each.
Set of Mouthpieces : Material Acrylic (1 No. each of)
Dia. 10 mm (L/D=1)
Dia. 10 mm (L/D = 2.5)
Dia. 10 mm (L/D = 4)
Ponter Gauge : To measure X-Y coordinates of Jet. Water Circulation: ½ HP Pump.

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Orifice & Mouthpiece Apparatus (closed water circuit)

KS/ME/ORIFIC&MOUTHP

Flow Measurement : Using Measuring Tank with Piezometer. minimum capacity 25 Ltrs.
Sump Tank : Minimum capacity 70 Ltrs.
Inlet Tank : Minimum capacity 35 Ltr provided with variable head arrangement.
Stop Watch: Electronic.
Control Panel Comprises of : Standard make On/Off Switch, Mains Indicator, etc.
Tanks shall be made of Stainless Steel.
The whole set-up shall be well designed and arranged on a rigid structure painted with industrial PU Paint.

Experimental Capability:
To determine the coefficient of discharge of different Orifice and mouthpieces. To determine the coefficient of velocity of different Orifice and mouthpieces.

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Flow Visualization Apparatus (laminar flow table)

KS/ME/FLOWVISAPP

The set-up is a self-contained water recirculating unit, provided with a sump tank. Inlet calming section, centrifugal pump etc.

The set-up is designed to visualize the ideal flow around the immersed body. It consists of a flow table in which flow of water is circulated in between two transparent sheets with a small gap between them. Water is supplied to the table and a coloured dye is injected in the inlet of water flow at different locations.

Utilities Required:
Electricity supply: Single Phase, 220 V AC, 50 Hz, 5-15m Amp. Combined socket with earth connection. Earth voltage shall be less than 5 volts.
Water Supply: Initial fill only (closed water circuit)
Floor Drain.
Floor Area: 1.5 x 1.0 m.
Chemical Required: Dye ($KMnO_4$) -20 gms

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Flow Visualization Apparatus (laminar flow table)

KS/ME/FLOWVISAPP

Technical Details:
Flow Table: Length 750 mm (approx.), width 500 mm (approx.) Material: Stainless steel
Transparent Sheet: Material Glass/Acrylic
Water Circulation: FIIP Pup.
Sump Tank : Material- Stainless Steel, Minimum capacity 90 Ltrs
Dye Vessel: Material- Stainless Steel, Capacity-2 Ltrs (approx)
The whole set-up shall be well designed and arranged on a rigid structure painted with industrial PU Paint.

Experimental Capability:
To visualize the ideal flow around the immersed bodies of different types.

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Apparatus for Metacentric Height

KS/ME/METACENTRICH

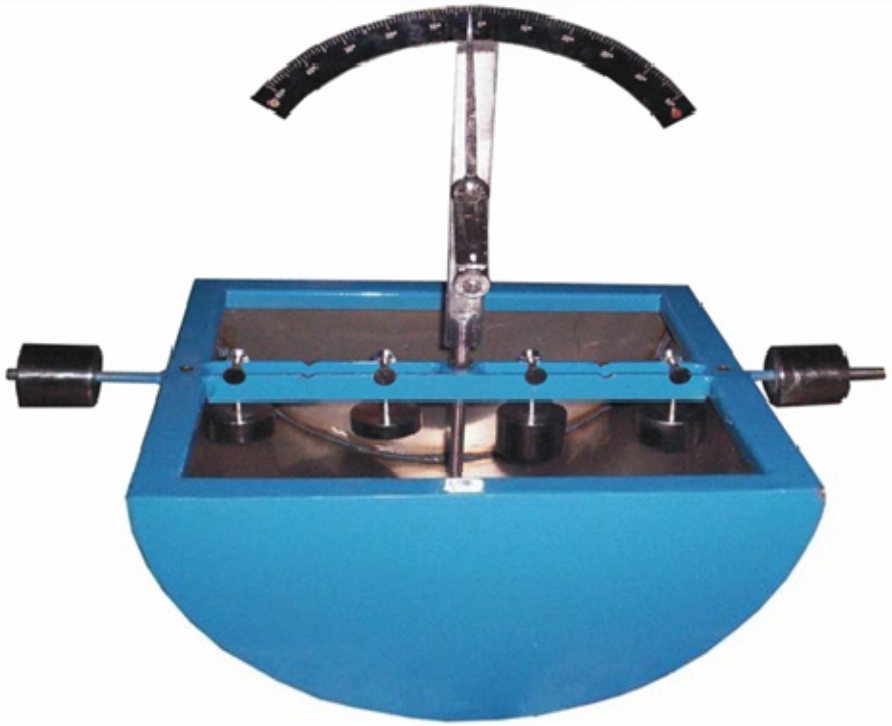
This apparatus is used to determine the metacentric height of a ship model under load and unload condition. (flat bottomed vessel). I+ consists of a Rectangular tank with one side transparent and a pontoon is allowed to float ir this tank. A set of weights is supplied with the apparatus.

Utilities Required:

Water Supply : Initial Fill.

Floor Drain

Floor Area: 1.0 m x 0.6 m.



Technical Details:

Pontoon:

Material: Acrylic. Provided with Horizontal Gu Bar for sliding weight.

Removable Strips

Pointer with Scale

Moveable hanger

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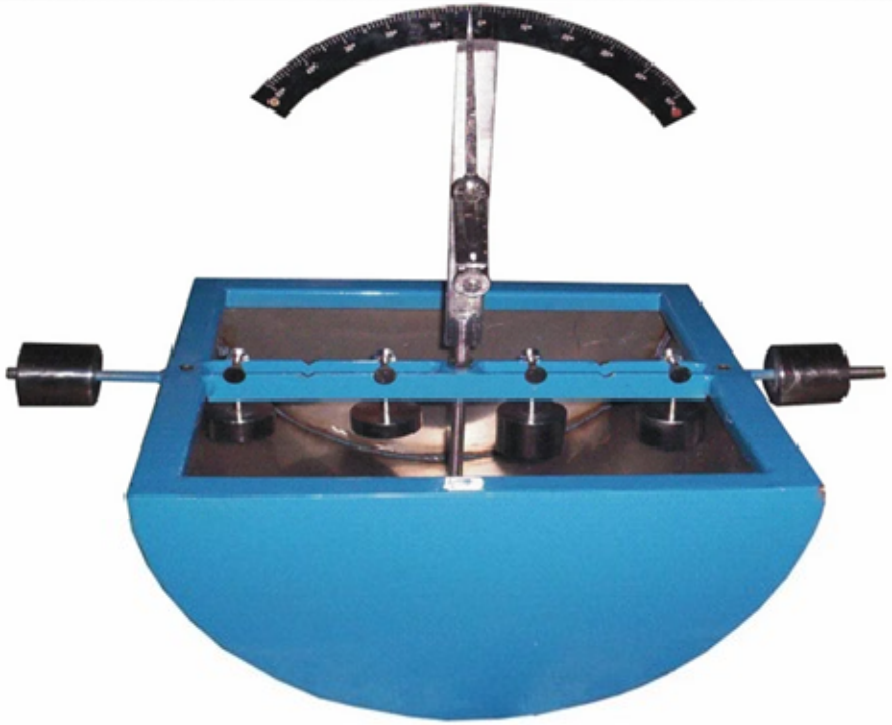
Apparatus for Metacentric Height

KS/ME/METACENTRICH

Water Tank : Size 550 x 500x 400 mm (approx.)
Transparent Window : Made of Glass Perspex.
A set of weights is supplied with the apparatus.
Pendulum and graduated scale are for accurate measurement of Tilt angle.
Tanks shall be made of Stainless Steel.
The whole set-up shall be well designed and arranged on a rigid structure painted with industrial PU Paint.



Experimental Capability: Determination of the metacentric height and position of the metacentric height with angle of heel of ship model.
To determine the loading capacity & coresponding position of the metacentre.
Study the change in meta-centre height as the C.G of the vessel changed i.e. either lowered or raised.

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Falling Ball Viscometer

KS/ME/FALLINGBALLVIS

The apparatus has been designed to introduce students to the fundamental characteristics of the viscous fluid flow. Particles covering a range of sizes and densities are supplied and the experiments are conducted by allowing single particles to fall through liquids contained in vertical glass tube.

Technical Details:

Single Columns : Material Glass. Diameter 40-80 mm. Length - 700 mm.
Stop Watch : Electronic.
Steel Balls : Two of different size. 10 Nos.
The whole set-up shall be designed and arranged on a rigid structure painted with industrial PU Paint.

Experimental capabilities:

To determine viscosity of a given fluid using falling ball viscometer.

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Pipe Friction apparatus

KS/ME/PIPEFRICAPP

This apparatus is used to measure Darcy's friction coefficient (F) for given pipes. The system is closed circuit.

Utilities Required:
Electricity supply: Single Phase, 220 V AC, 50 Hz. 5-15m Amp. Combined socket with earth connection.
Earth voltage shall be less than 5 volts.
Water Supply: Initial fill only (closed water circuit)
Floor Drain.
Floor Area: 2.5 x 0.75 m.

Technical Details: Pipe Test Section: (i) Dia ½", Pr. Taping Length: 1m, Material G.I.
(ii) Dia 3/4", Pr. Taping Length: 1.25m, Material G.I.
Water Circulation:½ HP Pump,
Flow Measurement: Using Measuring Tank with Piezometer, Minimum capacity 25 Ltrs.
Sump Tank : Minimum capacity 50 Ltrs.

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Pipe Friction apparatus

KS/ME/PIPEFRICAPP

Pressure measurement : Pressurized Differential Pressure Manometer C
Stop Watch : Electronic.
Control Panel Comprises of: Standard make On/Off Switch, Mains Indicator. etc. Tanks shall be made of Stainless Steel.
The whole set-up shall be well designed and arranged on a rigid structure painted with industrial PU Paint.

Experimental Capability:
To determine the losses due to friction in pipes.
To determine the friction factor for Darcy-Weisback equation.

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KALPANA SCIENTIFIC
KONNAGAR, HOOGLY, WEST BENGAL, INDIA
Email : kalpanascientifickolkata@gmail.com,
Website: www.kalpanascientific.com Call: 7029894454

Technical Compliance sheet of Hydraulics Engineering Laboratory Equipment

Sl. No.	Item Name	Specifications	Make & Model No.	Compliance (Yes/No)
1.	**Bernoulli's apparatus (closed water circuit)**	The apparatus is used to verify Bernoulli's Theorem. The system is closed circuit. • Utilities Required: Electricity supply: Single Phase, 220 V AC, 50 Hz, 5-15m Amp. Combined socket with earth connection. Earth voltage shall be less than 5 volts. Water Supply: Initial fill only (closed water circuit) Floor Drain. Floor Area: 1.5 x 0.75 m. • Technical Details: Test Section : Convergent and Divergent section, Material Acrylic. Piezometer Tubes : Material P.U. Tubes (at least 7 Nos.) Water Circulation : ½ HP Pump Flow Measurement: Using Measuring Tank with Piezometer, minimum capacity 25 Ltrs. Sump Tank : Minimum capacity 70 Ltrs. Inlet Tank : Minimum capacity 20 Ltrs. with fixed overflow arrangement. Stop Watch: Electronic. Control Panel Comprises of: Standard make On/Off Switch, Mains Indicator, etc. Tanks shall be made of Stainless Steel. The whole set-up shall be well designed and arranged on a rigid structure painted with industrial PU Paint. • Experimental Capability: To verify the Bernoulli's Theorem experimentally. To plot the Total energy vs distance	Make: KALPANA SCIENTIFIC Model No.: **KS/ME/BERNOULLIAPP**	Yes
2.	**Orifice & Mouthpiece Apparatus (closed water circuit)**	This apparatus is used to determine the coefficient of discharge (Cd), Coefficient of velocity (Cv) and Coeflicient of contraction (Cc) of different types of orifice. The system is closed circuit.	Make: KALPANA SCIENTIFIC Model No.: **KS/ME/ORIFIC&MOUTHP**	Yes

		• Utilities Required: Electricity supply: Single Phase, 220 V AC, 50 Hz, 5-15m Amp. Combined socket with earth connection. Earth voltage should be less than 5 volts. Water Supply: Initial fill only (closed water circuit) Floor Drain. Floor Arca: 1.5 x 0.75 m. • Technical Details: Set of Orifices: Material Acrylic. Dia 10 mm and 15 mm. 1no. each. Set of Mouthpieces : Material Acrylic (1 No. each of) Dia. 10 mm (L/D=1) Dia. 10 mm (L/D = 2.5) Dia. 10 mm (L/D = 4) Ponter Gauge : To measure X-Y coordinates of Jet. Water Circulation: ½ HP Pump. Flow Measurement : Using Measuring Tank with Piezometer. minimum capacity 25 Ltrs. Sump Tank : Minimum capacity 70 Ltrs. Inlet Tank : Minimum capacity 35 Ltr provided with variable head arrangement. Stop Watch: Electronic. Control Panel Comprises of : Standard make On/Off Switch, Mains Indicator, etc. Tanks shall be made of Stainless Steel. The whole set-up shall be well designed and arranged on a rigid structure painted with industrial PU Paint. • Experimental Capability: To determine the coefficient of discharge of different Orifice and mouthpieces. To determine the coefficient of velocity of different Orifice and mouthpieces.		
3.	**Flow Visualization Apparatus (laminar flow table)**	The set-up is a self-contained water recirculating unit, provided with a sump tank. Inlet calming section, centrifugal pump etc. The set-up is designed to visualize the ideal flow around the immersed body. It consists of a flow table in which flow of water is circulated in between two transparent sheets with a small gap between them. Water is supplied to the table and a coloured dye is injected in the inlet of water flow at different	Make: KALPANA SCIENTIFIC Model No.: **KS/ME/FLOWVISAPP**	Yes

		locations. • Utilities Required: Electricity supply: Single Phase, 220 V AC, 50 Hz, 5-15m Amp. Combined socket with earth connection. Earth voltage shall be less than 5 volts. Water Supply: Initial fill only (closed water circuit) Floor Drain. Floor Area: 1.5 x 1.0 m. Chemical Required: Dye (KMnO.) -20 gms • Technical Details: Flow Table: Length 750 mm (approx.), width 500 mm (approx.) Material: Stainless steel Transparent Sheet: Material Glass/Acrylic Water Circulation: FIIP Pup. Sump Tank : Material- Stainless Steel, Minimum capacity 90 Ltrs Dye Vessel: Material- Stainless Steel, Capacity-2 Ltrs (approx) The whole set-up shall be well designed and arranged on a rigid structure painted with industrial PU Paint. • Experimental Capability: To visualize the ideal flow around the immersed bodies of different types.		
4.	**Apparatus for Metacentric Height**	This apparatus is used to determine the metacentric height of a ship model under load and unload condition. (flat bottomed vessel). It consists of a Rectangular tank with one side transparent and a pontoon is allowed to float in this tank. A set of weights is supplied with the apparatus. • Utilities Required: Water Supply : Initial Fill. Floor Drain Floor Area: 1.0 m x 0.6 m. • Technical Details: Pontoon: Material: Acrylic. Provided with Horizontal Guide Bar for sliding weight. Removable Strips Pointer with Scale Moveable hanger	Make: KALPANA SCIENTIFIC Model No.: **KS/ME/METACENTRICH**	Yes

		Water Tank : Size 550 x 500x 400 mm (approx.) Transparent Window : Made of Glass Perspex. A set of weights is supplied with the apparatus. Pendulum and graduated scale are for accurate measurement of Tilt angle. Tanks shall be made of Stainless Steel. The whole set-up shall be well designed and arranged on a rigid structure painted with industrial PU Paint. • Experimental Capability: Determination of the metacentric height and position of the metacentric height with angle of heel of ship model. To determine the loading capacity & coresponding position of the metacentre. Study the change in meta-centre height as the C.G of the vessel changed i.e. either lowered or raised.		
5.	**Falling Ball Viscometer**	The apparatus has been designed to introduce students to the fundamental characteristics of the viscous fluid flow. Particles covering a range of sizes and densities are supplied and the experiments are conducted by allowing single particles to fall through liquids contained in vertical glass tube. • Technical Details: Single Columns : Material Glass. Diameter 40-80 mm. Length - 700 mm. Stop Watch : Electronic. Steel Balls : Two of different size. 10 Nos. The whole set-up shall be designed and arranged on a rigid structure painted with industrial PU Paint. • Experimental capabilities: To determine viscosity of a given fluid using falling ball viscometer.	Make: KALPANA SCIENTIFIC Model No.: **KS/ME/FALLINGBALLVIS**	Yes
6.	**Pipe Friction apparatus**	This apparatus is used to measure Darcy's friction coefficient (F) for given pipes. The system is closed circuit. • Utilities Required: Electricity supply: Single Phase, 220 V AC, 50 Hz. 5-15m Amp. Combined socket with earth connection. Earth voltage shall be less than 5 volts. Water Supply: Initial fill only (closed water circuit)	Make: KALPANA SCIENTIFIC Model No.: **KS/ME/PIPEFRICAPP**	Yes

		Floor Drain. Floor Area: 2.5 x 0.75 m. • Technical Details: Pipe Test Section: (i) Dia ½“, Pr. Taping Length: 1m, Material G.I. (ii) Dia 3/4“, Pr. Taping Length: 1.25m, Material G.I. Water Circulation:½ HP Pump, Flow Measurement: Using Measuring Tank with Piezometer, Minimum capacity 25 Ltrs. Sump Tank : Minimum capacity 50 Ltrs. Pressure measurement : Pressurized Differential Pressure Manometer C Stop Watch : Electronic. Control Panel Comprises of: Standard make On/Off Switch, Mains Indicator. etc. Tanks shall be made of Stainless Steel. The whole set-up shall be well designed and arranged on a rigid structure painted with industrial PU Paint. • Experimental Capability: To determine the losses due to friction in pipes. To determine the friction factor for Darcy-Weisback equation.		

Warranty: 1 Year

An instruction manual consisting of experimental procedures, block diagrams etc shall be provided along with the apparatus.

Installation, commissioning, testing and demonstration shall be provided.

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ISO 9001:2015

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4	AMBALA	BENGALI MOHALLA NEAR POST OFFICE AMBALA CANTT, HARYANA-133001

Name of application specialist /Service Engineer who have the technical competency to handle and Support the quoted product during the warranty period.

Name of the organization	Name of Contact Person	Contact No.
KALPANA SCIENTIFIC	DR. S.NEOGI, M.SC, M.TECH, Ph.D	7679774297
KALPANA SCIENTIFIC	DR. U.CHOWDHURY, M.SC, M.TECH, Ph.D	7029894454
KALPANA SCIENTIFIC	MRS. POUSHALI ROY, B.TECH, M.TECH	7718610048
KALPANA SCIENTIFIC	MR. SUSHOBHON PAL, BSc, MCA	9883267817
KALPANA SCIENTIFIC	MR. BHOLANATH SUTRADHAR, BSc	9064134925
KALPANA SCIENTIFIC	MR. SILADITYA PODDER, B.TECH	8240926428

Now we have three service centre in INDIA. During the warranty period, I/we shall provide free ,after sale service, and the replacement of any part(s) of the Equipment /Item or rectification of defects of work of the Equipment /Item will be free of cost. The replacement of the parts shall be arranged by us, at our own cost and responsibility during warranty period.

For KALPANASCIENTIFIC

KALPANA SCIENTIFIC DATE Rima Chowdhury

RUMACHOWDHURY,
PROPRIETOR
CALL: 7679774297
PLACE: KONNAGAR,
DATE:13.02.2025