GOVERNMENT POLYTECHNIC, NABARANGPUR
Government of Odisha
ସରକାରୀ ବହୁବୃତ୍ତି ଅନୁଷ୍ଠାନ , ନବରଙ୍ଗପୁର

DEPARTMENT OF CIVIL ENGINEERING

QUESTION BANK
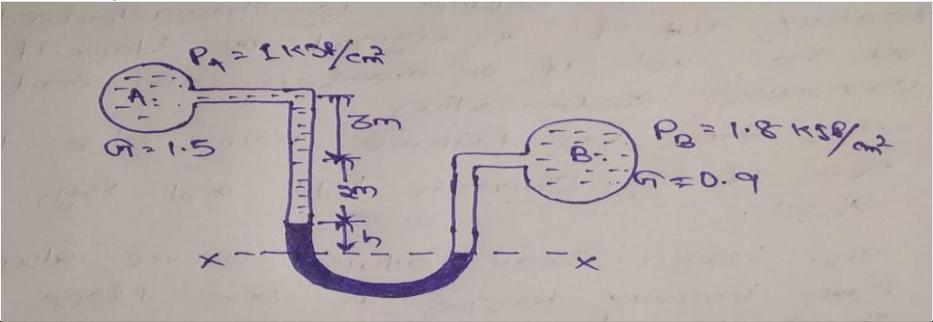# ON
HYDRAULICS & IRRIGATION ENGINEERING

PREPARED BY

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PART-A(HYDRAULICS)

UNIT-1 (HYDROSTATICS)

Q.NO.	PART-A (TWO MARKS QUESTIONS)
1	Define the following fluid properties: Density, weight density, specific volume and specific gravity of a fluid.
2	What is the difference between dynamic viscosity and kinematic viscosity? State their units of measurements and explain types of fluids.
3	State the Newton's law of viscosity and give examples of its application.
4	Explain briefly the following: Surface tension, compressibility and bulk modulus.
5	What is capillarity? Derive expression for height of capillary rise.
6	Define pressure. State Pascal's law. Calculate atmospheric pressure at 760 mm of mercury.
7	What are manometers? How are manometers classified?
8	What do you understand by Hydrostatic law?
9	Define the following: Atmospheric pressure, Gauge pressure, Vacuum pressure and Absolute pressure.
10	Find the pressure at a depth of 15 m below the free surface of water in a reservoir.
11	A stone weight 392.4 N in air and 196.2 N in water. Compute the volume of stone.
12	A wooden block of width 2m, depth 1.2 m and length 4m floats horizontally in water. Find the volume of water displaced and specific gravity of the wood is 0.7.
13	Define Total pressure & Center of pressure.

Q.NO.	PART-B (FIVE MARKS QUESTIONS)
1	State the different properties of fluid.
2	Find the surface tension in a soap bubble of 40mm diameter when the inside pressure is 2.5 N/m^2.
3	An oil of specific gravity is contained in a vessel. At a point the height f oil is 40m. find the corresponding height of water at the point.
4	A pipe contains an oil of Sp. Gravity 0.9. A differential manometer connected at the two points A & B shows a difference in mercury level as 15cm. Find the difference of pressure at the two points.
5	Calculate the specific weight ,density and specific gravity of 1 lit of a liquid which weight 7 N.

Q.NO.	PART-C (TEN MARKS QUESTIONS)
1	A plate 0.025mm distant from fixed plate moves at 60cm/sec and required a force of 2 N/m^2 to maintain speed. Determine the fluid viscosity between the plates.
2	Calculate the capillary rise in a glass tube of 2.5mm diameter when immersed vertically in (a) Water (b) Mercury .The surface tension for water and mercury are 0.725N/m & 0.52N/m respectively. Angle of contact for mercury 130°.

3	An open tank contain water up to a depth of 2m & above it an oil of sp.gravity 0.9 for a depth of 1m. find the pressure intensity.
	    (a) at the interface of the two liquids
	    (b) at the bottom of the tank

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4	The height of a simple U-tube manometer containing mercury is open to the atmosphere while the left limb is connected to a pipe in which a fluid of Sp. Gravity 0.9 is flowing . The center of pipe is 12cm below the level of mercury in the right limb. Find the pressure of fluid in the pipe if the difference of mercury levels in the two limbs is 20cm.
5	A differential manometer is connected at the two points A & B of two pipes as shown in fig. The pipe A contains a liquid of Sp.gravity 1.5 while pipe B contain a liquid of Sp. Gravity 0.9. The pressure at A & B are 1kgf/cm^2 and 1.8 kgf/cm^2 respectively. Find the difference in mercury level in the differential manometer.
6	Determine the total pressure & center pressure on a circular plate of diameter 1.5m which is placed vertically in water in such a way that the center of plate is 3m below the free surface of water. Find the position of center of pressure also.

	UNIT-2 (KINEMATICS OF FLUID FLOW)
Q.NO.	**PART-A (TWO MARKS QUESTIONS)**
1	Define Rate of discharge of liquid.
2	Define continuity equation.
3	State the assumptions taken into consider for derivation of Bernoulli's equation.
4	State the Bernoulli's equation.
5	Write down the practical application of Bernoulli's equation.
6	Define venturimeter and state its parts.
7	Write down the discharge formula for venturimeter.
8	What is orifice meter?
9	Define pitot tube.
10	What are the limitations of Bernoulli's equation.
11	Write down the discharge formula for orifice meter.
12	Define notches and weir.
13	Classify the notches according to its shape.
14	What are the different classifications of weir?
15	Write down the discharge formula for a triangular notch.
16	Define steady and unsteady flow.

17	Define Uniform and Non-uniform flow.
18	Define Laminar and turbulent flow.
19	Define Reynolds's Number and what its value for different type of flow?
20	Write down the Darcy-weisbach formula.
21	State the different types of minor energy losses.
22	Define Hydraulic gradient line and Total energy line.
23	What do you mean by open channel?
24	What do you mean by most economical channel section?
25	What are the conditions required to be a most economical rectangular section?
26	What are the conditions required to be a most economical trapezoidal section?

Q.NO.	PART-B (FIVE MARKS QUESTIONS)
1	Water is flowing through a pipe of 50cm diameter under a pressure of 29.43 N/cm^2 & with mean velocity of 2 m/s. Find the total head or total energy per unit weight of the Water at cross-section which is 5m above the datum line.
2	A horizontal venturimeter with inlet and throat diameter 30cm & 15cmrespectively is used to measure the flow of water. The reading of differential manometer connected to the inlet and the throat is 20cm of mercury. Determine the rate of flow. Take C_d=0.98.
3	An orifice meter with orifice dia. 10cm is inserted in a pipe of 20cm. The pressure gauge fitted upstream and downstream of the orifice meter gives reading of 19.62 N/cm^2 & 9.81 N/cm^2 respectively. Find the discharge through the orifice if C_d=0.6.
4	Find the velocity of flow of an oil through a pipe, when the difference of mercury in a differential U-tube manometer connected to the two tapping of pitot tube is 100mm.take coefficient of pitot tube is 0.98 and Sp gravity of oil is 0.8.
5	Determine the height of a rectangular weir of length 6m to be built across a rectangular channel. The maximum depth of water on the upstream side of the weir is 1.8m and discharge is 2000 lit/sec. Take C_d=0.6.
6	Find the discharge of water flowing over a rectangular notch of 2m length when the constant head over the notch is 300mm. Take C_d=0.6.
7	What do you mean by energy losses and what are the different types of losses?
8	Find the velocity of flow and rate of flow of water through a rectangular channel of 6m wide and 3m deep, when it is running full. The channel having bed slope as 1 in 2000. Take chezy's constant 55.

Q.NO.	PART-C (TEN MARKS QUESTIONS)
1	A 30cm diameter pipe conveying water, branches into two pipes of diameter 20cm & 15cm respectively. If the average velocity in the 30cm diameter pipe is 2.5 m/s. Find the discharge in 30 cm pipe. Also determine the velocity in 15cm dia. pipe if the velocity in 20cm pipe is 2m/s.
2	The water is flowing through a pipe having diameter 20cm and 10cm at section 1 & 2 respectively. The rate of flow through pipe is 35lit. The section 1 is 6m above datum and section 2 is 4m above datum. If the pressure at section 1 is 39.24 N/cm^2. Find the intensity of pressure at section 2.
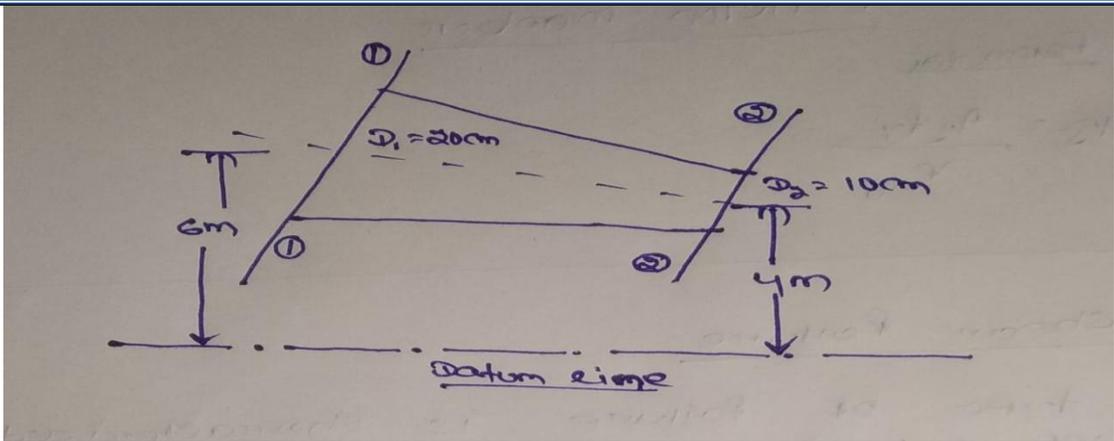
3	Find the discharge through a trapezoidal notch which is 1 m wide at the top and 0.40m at the bottom and 20cm is height. The head of water on the notch is 20 cm. Assume C_d=0.62 for rectangular portion and for triangular portion 0.60m.
4	Find the head loss due to friction in a pipe of diameter 300 mm and length 50 m, through which water is flowing at a velocity of 3m/s using Darcy's formula.Take kinematic viscosity of water =0.01 stoke.
5	A flow of water of 100litrs per second flows down in a rectangular flume of width 600mm and having adjustable bottom slope. If chezy's constant is 56, Find the bottom slope necessary for uniform flow with a depth of flow 300mm.
6	Find the discharge through a rectangular channel of width 2m, having a bed slope of 4 in 8000. The depth of flow is 1.5m and take the value of N in manning's formula as 0.012.

UNIT-3 (PUMP)	
Q.NO.	PART-A (TWO MARKS QUESTIONS)
1	Define pump.
2	Write down the main parts of a centrifugal pump?
3	Define Static head.
4	What do you mean by manometric head?
5	Define mechanical efficiency?
6	Write down the discharge formula for single acting and double acting reciprocating pump.
7	Write down the different types of reciprocating pump.
8	Define slip of reciprocating pump.
Q.NO.	PART-B (FIVE MARKS QUESTIONS)
1	Describe the important efficiency of a centrifugal pump.
Q.NO.	PART-C (TEN MARKS QUESTIONS)
1	Describe the parts of a centrifugal pump with neat sketch.
2	Describe the working principle of a reciprocating pump with neat sketch.

PART-B (IRRIGATION ENGINEERING)

UNIT-1 (WATER REQUIRMENT OF CROPS)

Q.NO.	PART-A (TWO MARKS QUESTIONS)
1	Define Irrigation.
2	What are the benefits of irrigation?
3	What do you mean by GCA & CCA?
4	Define Intensity of irrigation.
5	If total culturable command area is 1000 hectre where wheat is cultivated in 25 hectre then what is the value of intensity of irrigation for wheat?
6	Define Cash crop.
7	Define crop period & Base period.
8	Define Paleo irrigation.
9	Define Kor watering.
10	What do you mean by Duty?
11	Define Overlap allowance.
12	Define perennial irrigation.
13	What are the different types of surface irrigation?

Q.NO.	PART-B (FIVE MARKS QUESTIONS)
1	What do you mean by crop seson and what are the different types of crop season?
2	Derive relation between Duty, Delta & Base Period.
3	Find the delta for a crop when its duty is 864 hec/cumec, the base period of this crop is 120 days

Q.NO.	PART-C (TEN MARKS QUESTIONS)
1	The GCA of irrigation is 1 lakh hectre. The CCA is 75% of GCA. The intensity of irrigation for rice and wheat are 50% and 55% respectively. Find the area of each crop where the particular crop has been grown?
2	A channel is to be designed for irrigating 5000 hectres in Khariff crop and 4000 hectres in Rabi crop. The water requirement for khariff and rabi are 60cm and 25cm respectively. The base/kor period for Rabi & Khariff is 3 weeks and 4 weeks respectively. Determine the discharge of the channel for which it is to be design?

UNIT-2
(WATER LOGGING & CRSS DRAINAGE WORK)

Q.NO.	PART-A (TWO MARKS QUESTIONS)
1	Define Water logging.
2	Where a cross drainage work required?

3	Define super passage.
4	Define level crossing.
5	What are the types of cross drainage work required when a drainage and canal intersect at the same level?

Q.NO.	PART-B (FIVE MARKS QUESTIONS)
1	What are the different causes of water logging?
2	Write short note on Inlet and outlet.

Q.NO.	PART-C (TEN MARKS QUESTIONS)
1	What are the different types of preventive measure taken to control the water logging?
2	What are the ill effects of water logging?
3	Write down the different types of cross drainage work and describe each of them briefly.

UNIT-3 (HYDRLOGY)	

Q.NO.	PART-A (TWO MARKS QUESTIONS)
1	Define orographic precipitation.
2	Define Convective precipitation.
3	Define Rain gauge.
4	Write down the types of raingauge.
5	Define Iso-hytes.
6	Define Rainfall Hyrtograph.
7	Define Rainfall intensity.
8	What are the different methods used to calculate the average depth of precipitation?
9	Define Run off and its types.
10	Define Catchment area.
11	Write down the Dicken's & Ryve's formula for flood dishcharge.

Q.NO.	PART-B (FIVE MARKS QUESTIONS)
1	What are the different types of precipitation occur?
2	Write down short note on floating type rain gauge.
3	The following are the rates of rainfall for successive 30 min period for a stroam duration of 210 min.(5.5,6.0,12.5,8.0,3.25 and 6.5 cm/hr). Find the total rainfall?

Q.NO.	PART-C (TEN MARKS QUESTIONS)
1	What are major components of Hydrological cycle describe with neat sketch?
2	Describe the working principle of simson's raingauge with neat sketch.
3	Find the flood discharge for an area using Dicken's & Ryve's formula. The constant c in

	Ryve's & Dicken's are 6.8 and 11.5 respectively. The area of catchment is 100000 hectre.

UNIT-3 (FLOW IRRIGATION)

Q.NO.	PART-A (TWO MARKS QUESTIONS)
1	Classify the canal based on function and financial output.
2	Define Alluvial & Non Alluvial canal.
3	Define contour canal.
4	Define contour line and watershed line.
5	Define free board.
6	Define Dowla & Berm.
7	Write down the factors taken into consider while determining the land width.
8	Define canal lining and write down the name of different types of lining.

Q.NO.	PART-B (FIVE MARKS QUESTIONS)
1	What are the different classifications of canal according to discharge?
2	What are the different classifications of canal according to alignment?
3	Write down the different types of losses occur in a canal.

Q.NO.	PART-C (TEN MARKS QUESTIONS)
1	Describe the different components of an irrigation canal and its function with neat sketch.
2	What are the advantages and disadvantages of canal lining?
3	What are the different types of canal lining describe each briefly?

UNIT-4 (DAM)

Q.NO.	PART-A (TWO MARKS QUESTIONS)
1	Define Dam.
2	Write down the function of a dam.
3	Draw the neat sketch of solid gravity dam.
4	What do you mean by Piping or undermining?
5	Define overtopping in a earthen dam.
6	Define spillway.
7	Write down only the name of different types of spillway.
8	Why gallery is provided in a Concrete gravity dam?
9	Define coffer dam.
10	Define gravity dam.

11	What are the various forces acting in a gravity dam?
12	Define Rigid & Non rigid dam.
Q.NO.	**PART-B (FIVE MARKS QUESTIONS)**
1	Write down the different causes of failure of gravity dam?
2	What are the different causes of failure of Earthen dam?
3	Describe ogee spillway with neat sketch.
4	Describe chute spillway with neat sketch.
Q.NO.	**PART-C (TEN MARKS QUESTIONS)**
1	What are the different classifications of dam? Explain briefly.
2	What are the different classifications of earthen dam?
3	What are the factors consider at the time of selection of site for a dam?

UNIT-5
(DIVERSION HEAD WORKS AND REGULATORY STRUCTURES)

Q.NO.	**PART-A (TWO MARKS QUESTIONS)**
1	Define weir & barrage.
2	What do you mean by scouring sluices?
3	What do you mean by fish ladder
Q.NO.	**PART-B (FIVE MARKS QUESTIONS)**
1	Write down the various objective of a diversion head work.
2	Describe different parts of a barrage with neat sketch.
Q.NO.	**PART-C (TEN MARKS QUESTIONS)**
1	Describe briefly the various components of a diversion head work with neat sketch.