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DR. VITHALRAO VIKHE PATIL FOUNDATION'S DR. VITHALRAO VIKHE PATIL COLLEGE OF ENGINEERING

।। नहि ज्ञानेन सदृशं पवित्रमिष्ट विद्यते ।।

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The National Board of Accreditation (NBA), New Delhi has been accredited U.G. Courses in Civil, Mechanical, Electronics & Telecommunication and Instrumentation & Control Engineering Accredited by National Assessment and Accreditation Council (NAAC), Banglore

Ref. No. COL Civil 2019 2086

Date: - 21.8 2010

The Executive Engineer.

Hydrology Project Division.

Near Gajanan Maharaj Mandir, Garkheda road,

Aurangabad- 431005

Subject: Permission for Technical Visit of T.E. Civil Students. Dear Sir.

Dr.V.V.Patil College of Engineering was established in 1983 and is approved by MC11 New Delhi, Govt. Maharashtra and affiliated to Savitribai Phule University of Pune. Pune per the University Syllabus T. E. Civil Students are having subject Hydrology and Water Resource Engineering. To understand the concept of rain gauge station, evaporator pan, stream gauging visit is necessary.

Regarding this Students are interested to visit Lully Climatic Station Newasa, in Ahmednagar district: I promise you that this visit is only for technical purpose. Therefore, it is requested to kindly grant the permission and necessary assistance for the visit. The visit is proposed on 12th September 2019.

Thanking you.

Yours faithfully (1) t'day P. Principal



Dr. Vithalrao Vikhe Patil Gellege of Engineering Ahmednagar

REPORT

ON

Study Tour of T.E. CIVIL STUDENTS

(11th September 2019) Presented by ALL T. E. (Civil) Students

Under the Guidance of Dr. M. P. Wagh (Tour In charge)

Department of Civil Engineering P.D.V.V.P. College of Engineering Ahmednagar (Year 2019-2020)

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SYNOPSIS

Whatever we get the knowledge from the theory lectures is not sufficient to understand clear concept regarding actual structure and about actual site. So Civil Engineering department arranged technical study visit for Third year Civil Engineering students of batch 2019-20 to get the practical knowledge of the subject Hydrology & Water Resource Engineering. Visit was conducted on 11th September 2019

The students visited the following projects.

- 1. Fully Climatic Station
- 2. River Stream Gauging Station

3. Demonstration of Surface Water Data Entry Software(SWDES)

The visit to above mentioned project helped the students to understand the Non recording Rain gauge, Self recording rain gauge, Open pan Evaporimeter, Meteorological Screen, wet bulb thermometer & dry bulb thermometer used for measuring Humidity, Hair hygrograph used to measuring and recording atmospheric Humidity, Thermograph used to measuring and recording atmospheric temperature Sun shine recorder, Wind vane used for indicating the direction from which wind is blowing Cup Counter Anemometer used for measuring the wind speed. River Stream Gauging used to measure the discharge and different methods of determining discharge as well as different instruments used for measurement of discharge such as velocity current meter, pigmi meter, propeller type current meter. In order to record the details of the sites visited this tour report is prepared which can be used by the forth coming batches of students as a reference to plan similar visits.





INDEX

Sr. No	Table Contents
1	Introduction.
2	Fully Climatic Station
3	River Stream Gauging Station
4	Conclusion
5	Visit Photographs
6	Permission letter
7	Thanks letter
8	Appendix



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Chapter No: -1 Introduction

Third year civil engineering students have subject Hydrology & Water resource Engineering. This includes Hydrological data and its sources, hydrological cycle, application of hydrology. Precipitation Forms, types of precipitation, measurement, analysis of precipitation data. Elementary concepts of evaporation and infiltration, effect of infiltration on runoff and recharge of ground water, evapo-transpiration, consumptive use, factor affecting it, its measurement and computations for evaporation, infiltration and evapo-transpiration. Selection of site, various methods and instrument required for discharge measurements.

To get the core knowledge of the subject a technical visit is organized at Newasa Fully climatic station & River stream gauging station. Newasa taluka is in Ahmednagar district Maharashtra state. Ahmednagar city has been established by Malik Ahmed Shah in 1494 and located in the central part of Maharashtra. Ahmednagar lies between $18^{\circ}02$ ' and $19^{\circ}09$ ' North latitudes and $73^{\circ}09$ ' and $75^{\circ}05$ ' East longitudes. Ahmednagar district covers an area of about 17, 0448 sq.km, which is area wise largest district in the state covering 5.55 % area of the total area of Maharashtra state.

The district is bounded on the north by the districts of Nasik and Aurangabad, on the East by Beed & Osmanabad, on the south by Solapur and on the west by Thane and Pune Districts. Ahmednagar is growing city with proposed five star industrial areas. It is one of the biggest business towns in Maharashtra state. It is the central places on Pune Aurangabad four lane express way. It is biggest town nearest to very famous holy place Shirdi (Shri Sai baba temple), Shani-shinganapur (Shani temple). Fully climatic station is established in 1989.

Objective of the Visit

- To learn the concept of rain gauge station and measurement of precipitation.
- To know about recording and non recording rain gauge station.
- To known about evaporimeters such as ISI A pan meter, classified pan meter.
- To know about sunshine recorder.
- To measure the humidity.
- To understand the concept of stream gauging.



Chapter No: -2

Fully climatic Station includes different parameters of hydrological cycles such as precipitation, evaporation, evapotranspiration, Humidity, temperature, atmospheric pressure, wind speed and direction of wind. All the parameter is very important to find out consumptive use of water, as well as to decide cropping pattern and design of canal.

Hydrological cycles

Hydrology is defined by 'Wisler' and 'Brater' as the science that deals with processes governing the depletion and repletion of water resources of the land areas of the earth General definition it is science deals with the occurrence, circulation and distribution of water of the earth and earth's atmosphere



Precipitation

Precipitation is any form of solid or liquid water that falls from the atmosphere to the earth's surface. Rain, drizzle, hail and snow are examples of precipitation. In India, rain is the most common form of precipitation.

Causes of precipitation

For the formation of clouds and subsequent precipitation, it is for necessary that the moist air masses to cool in order to condense. This is generally accomplished by adiabatic cooling of moist air through a process of being lifted to higher altitudes. The precipitation types can be categorized as.



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Measurement of rainfall

One can measure the rain falling at a place by placing a measuring cylinder graduated in a length scale, commonly in mm. In this way, we are not measuring the volume of water that is stored in the cylinder, but the 'depth' of rainfall. The cylinder can be of any diameter, and we would expect the same 'depth' even for large diameter cylinders provided the rain that is falling is uniformly distributed in space.

Now think of a cylinder with a diameter as large as a town, or a district or a catchment of a river. Naturally, the rain falling on the entire area at any time would not be the same and what one would get would be an 'average depth'. Hence, to record the spatial variation of rain falling over an area, it is better to record the rain at a point using a standard sized measuring cylinder.

In practice, rain is mostly measured with the standard non-recording rain gauge the details of which are given in Bureau of Indian Standards code IS 4989: 2002. The rainfall variation at a point with time is measured with a recording rain-gauge, the details of which may be found in IS 8389: 2003. Modern technology has helped to develop Radars, which measures rainfall over an entire region. However, this method is rather costly compared to the

Measurement of Precipitation

There are two types of rain gauges, non-recording type and recording type. Rain gauge is a type of instrument used by meteorologists and hydrologists to measure rainfall rate in a certain period of time. Rain gauges are also known as udometer, pluviometer and ombrometer.

E.g. Tipping Bucket Type Rain Gauge

Tipping bucket type rain gauge is a 30cm sized circular rain gauge adopted for use by US weather bureau. It has 30 cm diameter sharp edged receiver and at the end of the receiver is provided a funnel.

Pair of buckets are pivoted under this funnel in such a manner that when one bucket receives 0.25mm of precipitation (rainfall), it tips discharging its rainfall into the container, bringing the other bucket under the funnel.



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Tipping Bucket Rain Gauge

Tipping of bucket completes an electric circuit causing the movement of pen to mark on clock driven receiving drum which carries a recorded sheet. These electric pulses generated are recorded at the control room far away from the rain gauge station. This instrument is further suited for digitalizing the output signal.

Advantages of recording rain gauges:

- 1. Necessity of an attendant does not arise
- 2. Intensity of rainfall at anytime as well as total rainfall is obtained, where as non recording gauge gives only total rainfall.
- 3. Data from in accessible places (hilly regions) can be continuously obtained once gauge is established.
- 4. Human errors are eliminated.
- 5. Capacity of gauges is large.
- 6. Time intervals are also recorded.

Disadvantages of recording rain gauges:

1. High initial investment cost.

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2. Recording is not reliable when faults in gauge arise (mechanical or electrical) till faults are corrected.

Measurement of evapotranspiration

There are several methods available for measuring evaporation or

Evapotranspiration, some of which are given in the following sub-sections.

Potential Evapotranspiration (PET)

Pan evaporation

The evaporation rate from pans filled with water is easily obtained. In the absence of rain, the amount of water evaporated during a period (mm/day) corresponds with the decrease in water depth in that period. Pans provide a measurement of the integrated effect of radiation, wind, temperature and humidity on the evaporation from open water surface. Although the pan responds in a similar fashion to the same climatic factors affecting crop transpiration, several factors produce significant differences in loss of water from a water surface and from a cropped surface. Reflection of solar radiation from water in the shallow pan might be different from the assumed 23% for the grass reference surface. Storage of heat within the pan can be appreciable and may cause significant evaporation during the night while most crops transpire only during the daytime. There are also differences in turbulence, temperature and humidity of the air immediately above the respective surfaces. Heat transfer through the sides of the pan occurs and affects the energy balance.

Notwithstanding the difference between pan-evaporation and the

Evapotranspiration of cropped surfaces, the use of pans to predict ETo for periods of 10 days or longer may be warranted. The pan

Evaporation is related to the reference evapotranspiration by an

Empirically derived pan coefficient:

Where - ETo reference evapotranspiration [mm/day], KP pan coefficient [-], Epan pan evaporation [mm/day].

Evapotranspiration gauges

The modified Bellani plate atmometer has been offered as an alternative and simpler technique to combination-based equations to estimate evapotranspiration (ET) rate from green grass surface.



Chapter No. 3 River Stream Gauging Station

Discharge is also termed as rate of flow, is defined as the volume of water flowing through a cross-section in a time such as cubic meters per second (cumecs.). The objects of discharge measurement are accurate assessment of the available and dependable natural water resources of a river, their tributaries and streams for the development of irrigation and power potential, flood control, water supply, navigation etc.

Stream flow measurements techniques can be classified in to two categories

1. Direct determination 2. In Direct determination

- Direct determination
- a. Area Velocity methods
- b. Dilution Techniques
- c. Electromagnetic methods
- d. Ultra Sonic methods
- In Direct determination
- a. Hydraulic Structures such as Weirs, Flumes, and Gated structures
- b. Slope area methods

Notches and Weir

Notch is an opening in the side of tank extending above free surface and of any geometric shape

Weirs are large structures and may be sharp edged or may have substantial width in the direction of flow

Classification of notches based on shape

- 1. Rectangular (Discharge Q1 = 2/3Cd(2g)1/2 .L. H3/2)
- 2. Triangular or V notch (Discharge $Q2 = 8/15Cd(2g)1/2 \tan (Q/2) H5/2$)
- 3. Trapezoidal (Discharge Q3 = Q1+Q2)
- 4. Stepped or compound notch



Chapter No. 4 Conclusion

After the technical visit students can understand the following points

- Rain gauge station and measurement of precipitation.
- Understand concept of recording and non recording rain gauge station.
- Learn concept of evaporimeters such as ISI A pan meter, classified pan meter.
- Get the knowledge of sunshine recorder.
- Easily measure the humidity.
- Understand the concept of stream gauging.

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Visit photograph



Felicitation of Er. Suresh Bhange and Mr. Jaygude S.D by Dr. M. P. Wagh and Prof. D. S. Pathare Respectively(from Left)



Technical Visit to Fully Climatic Station Newasa, Ahmednagar.



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Precipitation recorded by using Float type Recording Rain gauge



Propeller Type Current Meter





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Sunshine Recorder to measure intensity of sunlight





Equipment present in Full Climatic Station Newasa



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कार्यकारी अभियंता,

जलविज्ञान प्रकल्प विभाग,

डॉ.हैडगेवार रुग्णालयाच्या बाजूस, गारखेडा परिसर, औरंगाबाद.

सहाराष्ट शासन

जलसंपदा विभाग

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दिनांक :- 21/08/2019

"जलसंपदा विभागाच्या संकेतस्थळास कृपया भेट द्या- https://wrd.maharashtra.gov.in"

ईमेलद्वारे/

जा.क.जविप्रविऔ/प्रशा-1/ 1048 /सप

प्रति.

उपविभागीय अभियंता, जलविज्ञान प्रकल्प उपविभाग, नेवासा.

विषय :- डॉ. विठ्ठलराव विखे पाटील, अभियांत्रिकी महाविद्यालयातील विद्यार्र्थ्यांना जलविज्ञान प्रकल्पासंबंधी आवश्यक तांत्रिक मार्गदर्शन करणे बाबत.

संदर्भ :- डॉ. विठ्ठलराव विखे पाटील, अभियांत्रिकी महाविदयालयाचे पत्र क्र. CEA/Civil/2086/ 2018 दिनांक 21/08/2019

उपरोक्त संदर्भीय पत्रान्वये डॉ. विठ्ठलराव विखे पाटील, अभियांत्रिकी महाविद्यालयाचे पत्र प्राप्त झाले त्यानुसार महाविद्यालयाअंतर्गत विद्यार्थ्यांना जलविज्ञान प्रकल्पासंबंधी व हवामान केंद्रासंबंधी तांत्रिक मार्गदर्शन आवश्यक आहे.त्यासाठी त्यांनी दि.12/09/2019 रोजी हवामान केंद्रास भेट देण्याचे प्रस्तावीत केले होते.दि.21/08/2019 रोजी या कार्यालयाचे श्री.पोतदार क.अ. यांनी महाविद्यालयाच्या स्थापत्य विभागप्रमुखाशी चर्चा केली त्याअनुषंगाने ही भेट दि.12/09/2019 ऐवजी दि.11/09/2019 रोजी ठेवणे महाविद्यालय व क्षेत्रीय अभियंते यांच्या सोयीचे होईल.

करिता या भेटी दरम्यान आपण क्षेत्रीय अभियंत्यामार्फत आपल्या उपविभागातील नेवासा येथील हवामान केंद्रात असलेल्या उपकरणाची माहिती दयावी व आवश्यक ते तांत्रीक मार्गदर्शन करावे.

सोबत :- 1) संदर्भाकिंत पत्र -

उपकार्यकारी अभियंता, जलविज्ञान प्रकल्प विभाग, औरंगाबाद.

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D: Com No.5/ New 2018/ प्रशा-1/ डिसेंबर / 15 12 18

Dr. Vithairao Vikhe Patil

प्रतः-प्राचार्य, डॉ. विठ्ठलराव विखे पाटील, अभियांत्रिकी महाविद्यालय अहमदनगर यांना माहितीस्तव सादर.महाविद्यालयाच्या विनंतीनुसार दि.11/09/2019 रोजी आपल्या महाविदयालयातील तृतीय वर्ष (स्थापत्य)विद्यार्थी व शिक्षकांना सकाळी ठीक 9:00 वाजता नेवासा येथे हवामान केंद्रात हजर राहण्याच्या सुचना द्याव्यात हवामान केंद्रात शास्त्रीय उपकरणे असल्या कारणाने विद्यार्थांना योग्य ती खबरदारी घेण्याचे सुचित करावे विद्यार्थ्यांच्या सुरक्षीततेची जबाबदारी महाविद्यालयाने स्विकारावी.प्रस्तुतची परवानगी विद्यार्थ्यांना शैक्षणीक मार्गदर्शन व्हावे या हेतुने प्रेरीत असल्यामुळे यासाठी कोणतेही अतिरीक्त शुल्क आकारण्यात येणार नाही.

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Vithalrao Vikhe Patil Foundation ।। नहि ज्ञानेन सदृशं पवित्रमिंह विदयते ।। DR. VITHALRAO VIKHE PATIL FOUNDATION'S Dr. VITHALRAO VIKHE PATIL FOUNDATION'S Affiliated to SPPU, Pune (ID. No. PU/AN/Engg./027/(1983) & recognized by A.LC.T.E., New Delhi & Govt. of Maharashtra Accredited by NAAC, Bangalore

Ref: CEA/Civil/ 2019/

Date: 17/09/2019

To The Sub Divisional Engineer Hydrology Project Sub-Division Newasa.

Subject: Letter of appreciation and expression of gratitude for Technical visit

Respected Sir,

The Institute appreciates and expresses sincere gratitude for your kind permission for Technical visit to Fully Climatic Station Newasa. Technical visit able to understand core knowledge of measurement of precipitation, different types of rain gauges such as recording and non recording. Students also get knowledge of measurement of evaporation, wind velocity measurement, humidity measurement, stream gauging etc. We are also thankful to Er. Suresh Bange for giving information about meteorological equipments and application of surface water data entry software We are also thankful to Mr. Jaygude S.D. for necessary help.

We look forward for constant collaboration with you for the benefit of students in future.

Thanking you,

Yours faithfully

(Dr. Uday P. Naik) Principal

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