

***TECH MEDHA 2021-22***

**Amrutvahini Sheti and Shikshan Vikas Sansth's**  
**AMRUTVAHINI POLYTECHNIC,**  
**SANGAMNER**



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### Principal's Message



**Prof. V. B. Dhumal**

### **Principal**

It gives me great pleasure to know that ‘**TECH MEDHA**’, Amrutvahini Polytechnic magazine 2021-22 is ready for publication. True to its name, this magazine gives an insight into the range and scope of the imagination and creativity of our students and faculty members. I applaud the editorial team for the hard work and dedication they have invested in realizing this goal, and wish my dear students success in all future endeavors. The highly qualified and dedicated members of staff have always stood shoulder with the management and have carried out their duties with a level of commitment.



I wish the management, staff and students of the college success in their future endeavors.

### Vice-Principal's Message



**Prof. G. B. Kale**

### **Vice-Principal**

Providing ample opportunities in engineering education is one of the most fundamental obligations we owe to our students because in Amrutvahini Polytechnic we are driven by the belief that every student deserves a high quality education. TECH MEDHA provides an intersection of great challenge and great opportunity for the students to review their efforts and to analyze their achievements in research and development. Technology is evolving at a dizzying rate and our classrooms may not be designed to keep pace with it. There may be a lot wrong in the style of education but the pages of TECH MEDHA tell the

tale of all that have been a part of what is right about the education they get in Amrutvahini Polytechnic.

I congratulate the team of students and the faculty for their tireless efforts that have come to fruition in the form of this magazine. I wish it all success and hope that this tradition that has been set by the current students will be carried through by the following generation of students to come.

## **EDITORS' NOTE**

### ***Dear Readers***

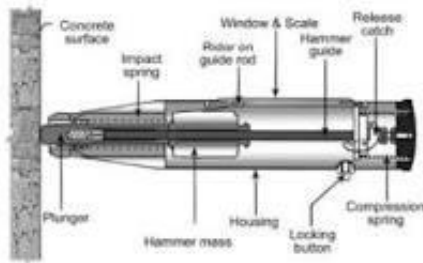
It gives us great pleasure to bring you the first issue of TECH MEDHA, the college magazine of AVP. The name and fame of an institute depends on the caliber and achievements of the students and teachers. The role of a teacher is to be a facilitator in nurturing the skills and talents of students. This magazine is a platform to exhibit the literary skills and innovative ideas of teachers and students. Medha presents the achievements of students and contributions of teachers. We would like to place on record our gratitude and heartfelt thanks to all those who have contributed to make this effort a success. We profusely thank the management for giving support and encouragement and a free hand in this endeavor. Last but not the least we are thankful to all the authors who have sent their articles. We truly hope that the pages that follow will make an interesting read.

**Prof. Shepal S. D.**

**Civil Dept.**

**Kale Suraj –CE3I-D**

## ***Rebound Hammer Test on Concrete***



Rebound Hammer test is a Non-destructive testing method of concrete which provide a convenient and rapid indication of the compressive strength of the concrete. The rebound hammer is also called as Schmidt hammer that consist of a spring controlled mass that slides on a plunger within a tubular housing. The operation of rebound hammer is shown in the fig.1. When the plunger of rebound hammer is pressed against the surface of concrete, a spring controlled mass with a constant energy is made to hit concrete surface to rebound back. The extent of rebound, which is a measure of surface hardness, is measured on a graduated scale. This measured value is designated as Rebound Number (rebound index). A concrete with low strength and low stiffness will absorb more energy to yield in a lower rebound value. Procedure for rebound hammer test on concrete structure starts with calibration of the rebound hammer. For this, the rebound hammer is tested against the test anvil made of steel having Brinell hardness number of about 5000 N/mm<sup>2</sup>. After the rebound hammer is tested for accuracy on the test anvil, the rebound hammer is held at right angles to the surface of the concrete structure for taking the readings. The test thus can be conducted horizontally on vertical surface and vertically upwards or downwards on horizontal surfaces as shown in figure below. If the rebound hammer is held at intermediate angle, the rebound number will be different for the same concrete.





Darade Rohan J CE3I-D

## *ULTRASONIC PULSE VELOCITY METHOD*



### ULTRASONIC PULSE VELOCITY

This test is done to assess the quality of concrete by ultrasonic pulse velocity method as per IS: 13311 (Part 1) – 1992. The underlying principle of this test is –

The method consists of measuring the time of travel of an ultrasonic pulse passing through the concrete being tested. Comparatively higher velocity is obtained when concrete quality is good in terms of density, uniformity, homogeneity etc.

Procedure to determine strength of hardened concrete by Ultrasonic Pulse Velocity.

i) Preparing for use: Before switching on the ‘V’ meter, the transducers should be connected to the sockets marked “TRAN” and ” REC”.

The ‘V’ meter may be operated with either:

a) The internal battery,

b) An external battery or

c) The A.C line.

ii) Set reference: A reference bar is provided to check the instrument zero. The pulse time for the bar is engraved on it. Apply a smear of grease to the transducer faces before placing it on the opposite ends of the bar. Adjust the 'SET REF' control until the reference bar transit time is obtained on the instrument read-out..

iii) Range selection: For maximum accuracy, it is recommended that the 0.1 microsecond range be selected for path length upto 400mm.

iv) Pulse velocity: Having determined the most suitable test points on the material to be tested, make careful measurement of the path length 'L'. Apply couplant to the surfaces of the transducers and press it hard onto the surface of the material. Do not move the transducers while a reading is being taken, as this can generate noise signals and errors in measurements. Continue holding the transducers onto the surface of the material until a consistent reading appears on the display, which is the time in microsecond for the ultrasonic pulse to travel the distance 'L'. The mean value of the display readings should be taken when the units digit hunts between two values.

Pulse velocity=(Path length/Travel time)

v) Separation of transducer leads: It is advisable to prevent the two transducer leads from coming into close contact with each other when the transit time measurements are being taken. If this is not done, the receiver lead might pick-up unwanted signals from the transmitter lead and this would result in an incorrect display of the transit time.

**ABOLI KHAIRNAR N CE3I-D**

***Concrete SLUMP Test-for Workability: Procedure and Result***

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Concrete slump test or slump cone test is to determine the workability or consistency of concrete mix prepared at the laboratory or the construction site during the progress of the work. Concrete slump test is carried out from batch to batch to check the uniform quality of concrete during construction. High-speed machining is not defined, however, as machining with a high material removal rate using a large axial depth of cut ( $A_p$ ) or large radial depth of cut. The slump test is the most simple workability test for concrete, involves low cost and provides immediate results. Due to this fact, it has been widely used for workability tests since 1922. The slump is carried out as per procedures mentioned in ASTM C143 in the United States, IS: 1199 – 1959 in India and EN 12350-2 in Europe. Generally concrete slump value is used to find the workability, which indicates water-cement ratio, but there are various factors including properties of materials, mixing methods, dosage, admixtures etc. also affect the concrete slump value.

#### Sampling of Materials for Slump Test

A concrete mix (M15 or other) by weight with suitable water/ cement ratio is prepared in the laboratory similar to that explained in 5.9 and required for casting 6 cubes after conducting Slump test. The slump (Vertical settlement) measured shall be recorded in terms of millimeters of subsidence of the specimen during the test.

**True Slump** – True slump is the only slump that can be measured in the test. The measurement is taken between the top of the cone and the top of the concrete after the cone has been removed as shown in figure-1.

**Zero Slump** – Zero slump is the indication of very low water-cement ratio, which results in dry mixes. These type of concrete is generally used for road construction.

**Collapsed Slump** – This is an indication that the water-cement ratio is too high, i.e. concrete mix is too wet or it is a high workability mix, for which a slump test is not appropriate.

**Shear Slump** – The shear slump indicates that the result is incomplete, and concrete to be retested.

Jondhale Rutaja S CE3I -D



### ***Building Information Modelling***

BIM allows architects to predict potential construction hazards and prevent them by adjusting the design. Contractors can also lead their teams safely through every step in the workflow and document the process to meet safety regulations and pass on-site evaluations.

Cost and Resource Savings

One significant benefit of BIM is that it provides reliable construction cost estimates long before the construction phase begins. Architects can use tools like BIM 360 Docs to estimate costs related to:

### **Greater Efficiency and Shorter Project Lifecycles**

Generally, the faster you can complete a structure's construction, the less money you will spend on the project overall. Also, finishing a project on time or early speeds up your eventual return on investment, as occupants can start using the space as soon as possible. With BIM, architects can design buildings faster and More Opportunities for Prefabrication and Modular Construction .BIM software is ideal for making detailed production models that can later be prefabricated off-site. Architects also have more opportunities to design modular pieces of architecture that fit perfectly together and include complex tolerance calculations. This, in turn, can save time and money, as contractors spend less time constructing pieces on-site from scratch start construction earlier.

**Bankar Ajit D CE5I-C**

## ***NEW IRRIGATION TECHNOLOGY***

Water resources projects are planned, funded, executed, and maintained by the State Governments themselves as per their own resources and priorities. Role of Government of India is limited to providing technical support and, in some cases, partial financial assistance under the existing schemes implemented by the Ministry of Jal Shakti.

In order to supplement the efforts of the State Governments, Government of India has taken many important initiatives for widespread promotion of technological advancements in irrigation. Use of remote sensing for monitoring of projects including ground water table estimation & cropped area assessment, SCADA based systems for irrigation, micro irrigation, underground pipelines for distribution, precision-irrigation, use of technology in watershed and springshed development for integrated development of rainfed areas through soil & water conservation including regeneration of ground water & arresting runoff, and use of solar pumps for ground water based irrigation in favorable regions, are some such



measures through which technology is being promoted in irrigation by Government of India.

As per the data for 2018-19 provided by Directorate of Economics & Statistics, Ministry of Agriculture & Farmers Welfare, percentage of net un-irrigated area over net area sown in the country is estimated to be about 48.65%. Further, it is estimated that 40% of the net sown area is expected to remain rainfed even after attainment of full irrigation potential of the country. Augmentation of irrigation is to be taken up by State Governments as per availability of resources and priorities. Government of India provides catalytic, technical and financial support to the State Governments, for the same.

In order to supplement the efforts of the State Governments, Government of India has taken many important initiatives for irrigation and water conservation, the key amongst which are given below:

1. Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) was launched during the year 2015-16, with an aim to enhance physical access of water on farm and expand cultivable area under assured irrigation, improve on-farm water use efficiency, introduce sustainable water conservation practices, etc.

PMKSY is an umbrella scheme, consisting of two major components implemented by this Ministry, namely, Accelerated Irrigation Benefit Programme (AIBP), and Har Khet Ko Pani (HKKP). HKKP, in turn, consists of four sub-components, being Command Area Development & Water Management (CAD&WM), Surface Minor Irrigation (SMI), Repair, Renovation and Restoration (RRR) of Water Bodies, and Ground Water (GW) Development component.

In addition, PMKSY also consists of two components being implemented by Ministries other than Jal Shakti Ministry. Per Drop More Crop (PDMC) component is being implemented by Department of Agriculture and Farmers Welfare, while Watershed Development component (WDC) is being implemented in 2019, Jal Shakti Abhiyan was launched by the Government of India. This was followed in 2021, by “Jal Shakti Abhiyan: Catch The Rain” (JSA:CTR) campaign. Focused interventions under these annual campaigns taken up by the Government of India and the State Governments, inter-alia, include renovation of traditional and



other water bodies/ tanks, enumeration, geo-tagging and making inventory of all water bodies, and removal of encroachments of tanks/lakes, and de-silting of tanks.

Since its launch till date, under JSA:CTR about 10.64 lakh water conservation and rain water structures have been completed, 1.79 lakh number of traditional water bodies have been renovated, 5.13 lakh reuse and recharge structures have been completed, and 15.32 lakh water bodies have been enumerated.

3. Government of India has launched the first Census of water bodies in convergence with the Sixth round of Minor Irrigation Census (reference year 2017-18), under the Centrally Sponsored Scheme – “Irrigation Census”. The objective of the Census of Water bodies is to develop a national database for all water bodies in the country.

4. Mahatma Gandhi National Rural Employment Guarantee Scheme (MNREGS) has provisions for public works relating to natural resource management, water conservation and water harvesting structures to augment and improve ground water like underground dykes, earthen dams, stop dams, check dams and roof top rain water harvesting structures in public buildings. by Department of Land Resources



## ***ROLL OF DESIGN ENGINEER IN DISIGNING SUBMARINES***



A submarine (or sub) is a watercraft capable of independent operation underwater. It differs from a submersible, which has more limited underwater capability. It is also sometimes used historically or colloquially to refer to remotely operated vehicles and robots, as well as medium-sized or smaller vessels, such as the midget submarine and the wet sub. Submarines are referred to as "boats" rather than "ships" irrespective of their size.<sup>[1]</sup>

Although experimental submarines had been built before, submarine design took off during the 19th century, and they were adopted by several navies. Submarines were first widely used during World War I (1914–1918), and are now used in many navies large and small. Military uses include attacking enemy surface ships (merchant and military), or other submarines, aircraft carrier protection, blockade running, ballistic missile submarines as part of a nuclear strike force, reconnaissance, conventional land attack (for example using a cruise missile), and covert insertion of special forces. Civilian uses for submarines include marine science, salvage, exploration and facility inspection and maintenance. Submarines can also be modified to perform more specialized functions such as search-and-rescue missions or undersea cable repair. Submarines are also used in tourism and undersea archaeology.

## **Internet of Things (IoT) will be leveraged to Engineer Smart Cities**

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### **1. Internet of Things (IoT):-**

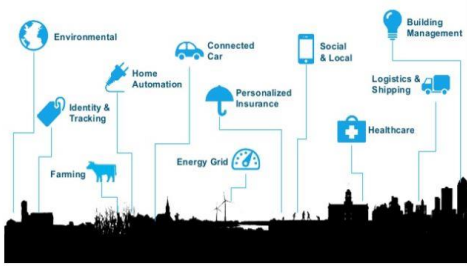
“Internet of Things” (IoT); is a megatrend which is quickly reshaping the way in which civil engineering projects are implemented. In a nutshell, IoT leverages sensors and network connectivity to allow communication between the interconnected sensors. IoT will play a leading role in monitoring the health of urban structures by pooling big data from the building management system. It will be capable of recording data such as variations in concrete humidity, vibrations, chloride content, and even abnormal deformations. It is one of the latest upcoming trends that will give rise to smart cities and improve the quality of life of its inhabitants.



**Fig. 1: Image showing Concept of Internet of Things**

### **2. Real Life IOT Applications:-**

Internet of things has found application in every Industry and sector like smart homes, smart buildings, travel and transportations, healthcare, retail, poultry & farming etc. The industrial Internet of things is also changing automation & logistics.



**Fig. 2: Image showing Internet of Things Ecosystem**

Some of the popular IOT applications are as follow –

- 1) Smart Home
- 2) Wearable Devices
- 3) Smart City
- 4) Smart Grids
- 5) Industrial Internet
- 6) Connected Cars
- 7) IoT in Agriculture
- 8) Smart Retail

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**S. H. Rajebhosale**

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### **Hotovoltaic glaze**

One of the most exciting new technologies used in civil engineering is building integrated photovoltaic (BIPV) glazing, which can help [buildings generate their own electricity](#), by turning the whole building envelope into a solar panel. Companies such as Polysolar provide transparent photovoltaic glass as a structural building material, forming windows, façades and roofs. Polysolar's technology is efficient at producing energy even on north-facing, vertical walls and its high performance at raised temperatures means it can be double glazed or insulated directly. As well as saving on energy bills and earning feed-in tariff revenues, its cost is only marginal over traditional glass, since construction and framework costs remain, while cladding and shading system costs are replaced.



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### **Kinetic Footfall**

One of the latest civil engineering technologies under development is kinetic energy. Pavegen provides a technology that enables flooring to harness the energy of footsteps. It can be used indoors or outdoors in high traffic areas, and [generates electricity from pedestrian footfall](#) using an electromagnetic induction process and flywheel energy storage. The technology is best suited to transport hubs where a large flow of people will pass over it. The largest deployment the company has done so far is in a football pitch in Rio de Janeiro to help power the floodlights around the pitch. It also currently has a temporary installation outside London's Canary Wharf station powering street lights.



