Hindusthan
College of Engineering and Technology
An Autonomous Institution

DEPARTMENT OF CIVIL ENGINEERING

AZIMUTH

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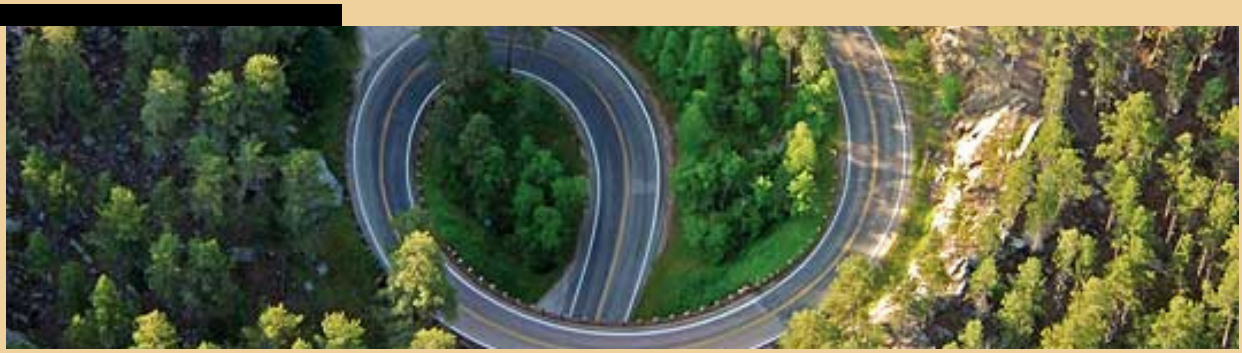
VISION OF THE DEPARTMENT

To be recognized globally for pre-eminence in Civil Engineering education, research and service.

MISSION OF THE DEPARTMENT

- **To impart scientific and technical knowledge for professional practice, advanced study and research in Civil Engineering.**
- **To equip the students with ingenious leadership and organizational skills for a successful professional career.**
- **To inculcate professional and ethical responsibilities related to industry, society and environment.**



PROGRAM EDUCATIONAL OBJECTIVES (PEO)

To produce graduates with the ability to

- **Excel as practicing engineers, academicians and researchers with a comprehensive knowledge in Civil Engineering.**
- **Play a significant role as team players and leaders in challenging environments for nation's infrastructure development, environmental protection and sustainability.**
- **Uphold professional and ethical responsibilities as engineers, consultants and entrepreneurs while addressing the demands of the society.**

PROGRAMME SPECIFIC OUTCOMES (PSO)

The graduates will be able to:

- **Apply their engineering knowledge, communication skills, professional and ethical principles to solve problems in civil engineering and contribute to the infrastructure development in a sustainable way.**
- **Use their engineering background to excel in competitive exams for advanced study, research and professional career.**

3D PRINTING

INTRODUCTION

3D printing (sometimes referred to as Additive Manufacturing (AM)) is the computer-controlled sequential layering of materials to create three-dimensional shapes. It is particularly useful for prototyping and for the manufacture of geometrically complex components.

It was first developed in the 1980s, but at that time was a difficult and expensive operation and so had few applications. It is only since 2000 that it has become relatively straightforward and affordable and so has become viable for a wide range of uses including product design, component and tool manufacture, consumer electronics, plastics, metalworking, aerospace engineering, dental and medical applications, and footwear.

The sales of AM machines, or '3D printers' has grown rapidly and since 2005, the home use of 3D printers has become practical.3D printing systems developed for the construction industry are referred to as 'construction 3D printers'.

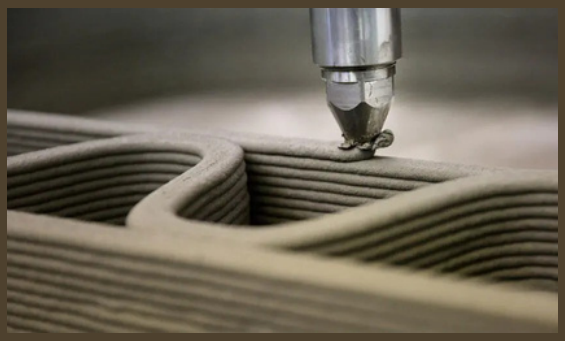
A 3D digital model of the item is created, either by computer-aided design (CAD) or using a 3D scanner. The printer then reads the design and lays down successive layers of printing medium (this can be a liquid, powder, or sheet material) which are joined or fused to create the item. The process can be slow, but it enables almost any shape to be created.

Depending on the technique adopted, printing can produce multiple components simultaneously, can use multiple materials and can use multiple colours.

Accuracy can be increased by a high-resolution subtractive process that removes material from an oversized printed item. Some techniques include the use of dissolvable materials that support overhanging features during fabrication.

Materials such as metal can be expensive to print, and in this case it may be more cost-effective to print a mould, and then to use that to create the item.

CONSTRUCTION INDUSTRY



In the construction industry, 3D printing can be used to create construction components or to 'print' entire buildings. Construction is well-suited to 3D printing as much of the information necessary to create an item will exist as a result of the design process, and the industry is already experienced in computer aided manufacturing. The recent emergence of building information modelling (BIM) in particular may facilitate greater use of 3D printing.

Construction 3D printing may allow, faster and more accurate construction of complex or bespoke items as well as lowering labour costs and producing less waste. It might also enable construction to be undertaken in harsh or dangerous environments not suitable for a human workforce such as in space.

3D PRINTED BRIDGE

In Spain, the first pedestrian bridge printed in 3D in the world (3DBRIDGE) was inaugurated 14th of December of 2016 in the urban park of Castilla-La Mancha in Alcobendas, Madrid.
The 3DBUILD technology used was developed by ACCIONA, who was in charge of the structural design, material development and manufacturing of 3D printed elements. The bridge has a total length of 12 m and a width of 1.75 m, and was printed in micro-reinforced concrete.
Architectural design was done by Institute of Advanced Architecture of Catalonia (IAAC). The 3D printer used to build the footbridge was manufactured by D- Shape.

The 3D printed bridge was developed through parametric design, which allows the optimisation of material distribution and minimises the amount of waste by recycling the raw material during manufacture. The computational design also allows the structural performance to be maximised, thanks to the application of generative algorithms and challenging the traditional techniques of construction. The project, led by ACCIONA, was developed by a multidisciplinary team of architects, mechanical engineers, structural engineers and representatives of the municipal administration, among them Enrico Dini, an expert inventor in large- scale 3D manufacturing and IAAC collaborator.

SPUR DIKES DESIGN AND REQUIREMENTS IN GEOMETRY

Spur dikes (or groynes) are structures constructed projecting from a bank to protect the bank from erosion. These are widely used for the purpose of river training and serve one or more of the following functions:

Training the river along a desired course by attracting, deflecting (or repelling) and holding the flow in a channel. An attracting spur creates deep scour near the bank; a deflecting spur shifts deep scour away from the bank, and a holding spur maintains deep scour at the head of the spur.

Creating a zone of slack flow with the object of silting up the area in the vicinity of the spur.

Protecting the river bank by keeping the flow away from it

These structures may either be impermeable or permeable so as to allow some flow parallel to the bank, but at a low enough velocity to prevent erosion and / or encourage sediment deposition. Care needs to be exercised in the use of spurs to ensure that they do not simply transfer erosion from one location to another, or initiate unforeseen changes in the general channel morphology.

By acting on the flow around them, spurs dikes tend to increase local velocities and turbulence levels in their vicinity. The structure of the dike itself may be liable to erosion; flow moving parallel to the bank is intercepted and accelerates along the upstream face of the dike towards the nose.

The high velocities and strong curvature of flow near the nose of a spur can cause significant scouring of the adjacent channel bed. Unless the foundations of the structure are deep enough or are well protected, the end section of dike may be undermined by local scour.

SPURS REQUIREMENTS

The requirements of a spur are:

1.***Optimum alignment and angle consistent with the objective.***

2.***Availability of a high river bank to anchor (or tie) the spur back, by extending it into the bank a sufficient distance to avoid it being outflanked.***

3.***Sufficient freeboard provision (in case of non-submerged spurs).***

4.***Adequate protection to nose/head against anticipated scour.***

5.***Shank protection with stone pitching and stone apron for the length which is vulnerable to flow attack.***

Depending upon the purpose, spurs can be used singly or in series. Spurs may be aligned either perpendicular to the bank line or at an angle pointing upstream or downstream. They can also be used in combination with other training measures. Their use in series is introduced if the river reach to be protected is long, or if a single spur is not efficient/strong enough to deflect the current and also not quite effective for sediment deposition upstream and downstream of itself. The structure located the farthest upstream in a series of spurs is much more susceptible to flow attack both on the river ward and landward ends. Thus it should be given special treatment to ensure its structural stability.

SPURS GEOMETRY

The position, length and shape of spurs depend on site conditions, and requires significant judgment on behalf of the designer. No single type of spur is suitable for all locations.

A spur angled upstream repels the river flow away from it and is called a repelling spur. These are preferred where major channel changes are required. A spur originally angled upstream may eventually end up nearly perpendicular to the streamlines after development of upstream side silt pocket and scour hole at the head. Repelling spurs need a strong head to resist the direct

attack of swirling current. A silt pocket is formed on the upstream side of the spur, but only when the spurs are sufficiently long. Repelling spurs are usually constructed in a group to throw the current away from the bank. Single spurs are neither strong enough to deflect the current nor as effective in causing silt deposition upstream and downstream.

A spur angled downstream attracts the river flow towards it and is called an attracting spur. The angle of deflection downstream ranges between 30 to 60 degrees. The attracting spur bears the full fury of the frontal attack of the river on its upstream face, where it has to be armored adequately. Heavy protection is not necessary on the downstream slope. It merges into the general stream alignment more easily. The scour hole develops off the river-ward end of the structure.

When the upstream angled spur is of short length and changes only the direction of flow without repelling it, it is called a deflecting spur. It gives local protection only.

The angle which the spur makes with the current may affect the results. A spur built normal to the stream usually is the shortest possible and thus most economic. An upstream angle is better to protect the river ward end of the spur against scour. A downstream angle might be better for protecting a concave bank, especially if spacing and the lengths of the spurs are such to provide a continuous protection by deflecting the main currents away from the entire length of bank.

HOLY BASIL

(TULSI)

Consumption of Holy basil, may prevent from

· Fever and common cold

· Sore throat

· Respiratory disorders

· Kidney stones

· Heart disorders

· Mouth infection

· Insect bites

· Tooth problems

· Headaches

· Eye disorder

PHYLLANTHUS NIRURI
(KIZHAR NELLI)

Consumption of Phyllanthus Niruri, may prevent from

· Hepatitis C.

· Bleeding caused by snake bite.

·Cures scabies, psoriasis, rhinitis and sinus problems, kidney stones and worms.

·Kizhar nelli is also used in the treatment of leprosy, bronchitis, anaemia, urinary discharge, anuria, asthma, hiccups, blood disorders, malaria and for enlargement of liver and spleen.

·In Unani system of medicine, it is used for treating chronic dysentery.

SOLANUM TRILOBATUM
(THUTHUVALAI)

Consumption of Solanum Trilobatum, may prevent from

· Anti-inflammatory activity

· Anti-oxidant activity

· Thuthuvalai for cancer

· Thoothuvalai as a Mosquito-repellent

· Thuthuvalai for Asthma

· Thuthuvalai for cold, cough and Throat Infection

ALOE VERA
(KATTRALAI)

·Aloe Vera Is High in Vitamins & Minerals

·Aloe Vera is an Adaptogen

·Aloe Helps in Detoxification

·Cardiovascular Health:

·Weight Loss – A Secondary effect

ACALYPHA INDICA
(KUPPAIMENI)

· Kuppaimeni leaves for skin
· Kuppaimeni for face
· Kuppaimeni for cold
· Kuppaimeni for eczema

ADHATODA VASICA
(AADATHODA)

· Consuming Adathoda Kasayam/Tea with honey reduces cough, cold, blood pressure, fever and tuberculosis.

· Adding a Cardamom when preparing the tea and drinking twice a day can cure cough, fever and blood pressure.

·Drinking adathoda kasayam/tea controls dysentery.

GLIMPSES OF STUDENTS TALENTS

என் கவிதை!

தனிமையில் தாழ் திறந்து
தவிப்புகள் மேல் ஓங்கும்!
உவமைகள் சூல் கொண்டு

உணர்வுகள் சொல் ஏந்தும்!
உறக்கத்தை உடைத்தெரிந்து

உள்ளூற்று பெருக்கெடுக்கும்!
கண்டதெல்லாம் கவியாக்க

எழுத்துக்கள் உருவெடுக்கும்!
அறியாத சொல் அடுக்க

அங்கங்கே பசை தடவும்!
புதிரான பல சொல்லை

எதிர் நீட்ட எத்தனிக்கும்!
ஒரு சொல்லோ வாள் நீட்டும்!
மறு சொல்லோ பால் ஊட்டும்!

எழுத்தாணி சிரம் தகர்த்தி
நீலக்குருதி தாள் நினைத்து
தீட்டிடுவேன் ஒரு காவியம்
உயிர் அறுந்தாலும் உலராது
உயிர்த்திடும் உணர்வோவியம்!

சக்தி ஸ்ரீ

Poetry by
Sakthi Shree R , II Civil

GLIMPSES OF STUDENTS TALENTS

Drawings by
Pooja K
II Civil

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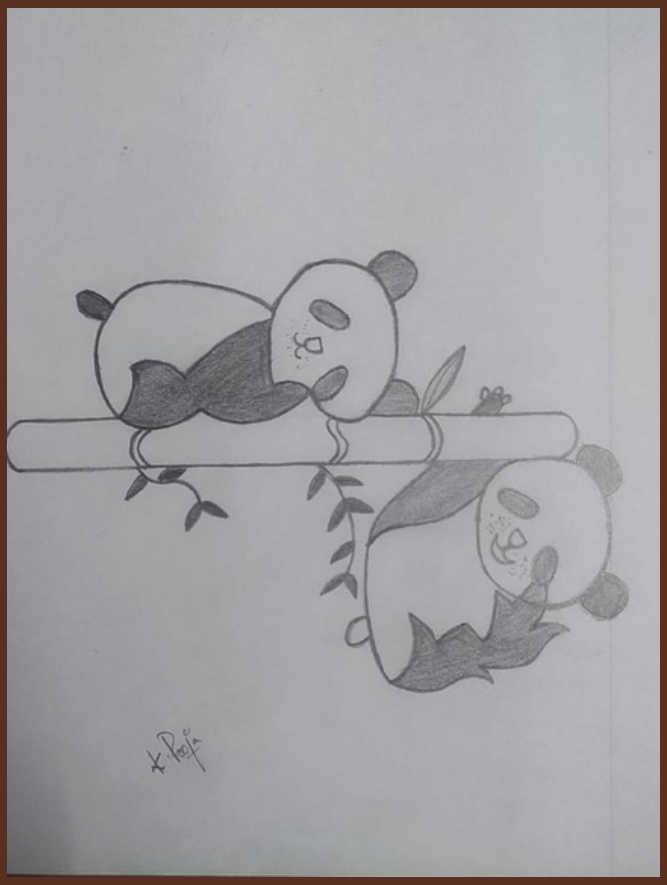

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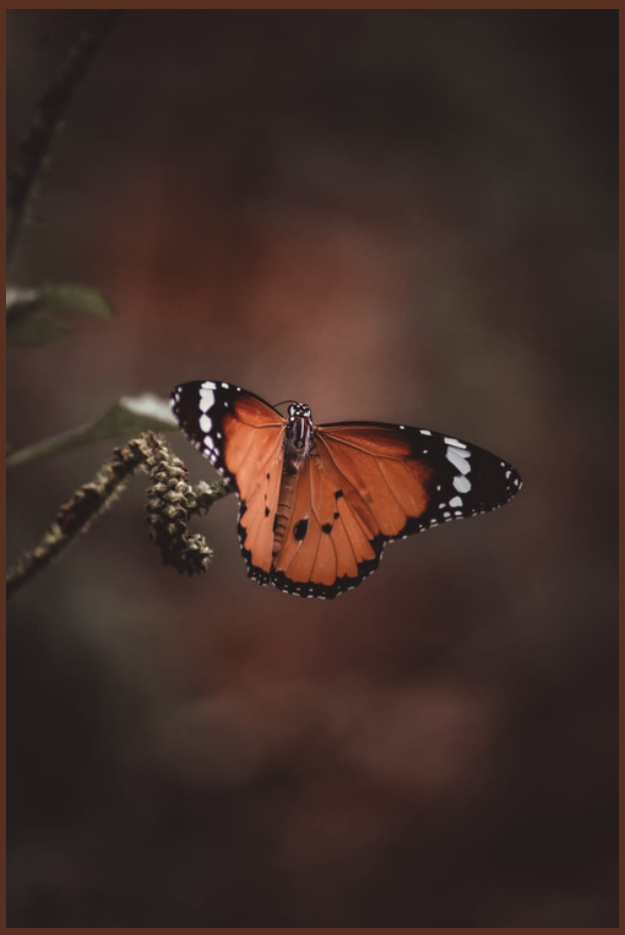

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Photography by
Surya Prakash R, II Civil

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GLIMPSES OF STUDENTS TALENTS

Photography by
SELVAM P
II Year Civil

GLIMPSES OF STUDENTS TALENTS

Drawing by
Sakthi Shree R , II Civil

Thank you...