MAHATMA GANDHI MISSION'S COLLEGE OF ENGUNEERING AND TECHNOLOGY, KAMOTHE, NAVI MUMBAI.

DEPARTMENT OF CIVIL ENGINEERING

ORGANIZED

FOUR DAYS WORKSHOP

ON

APPLICATION OF SMART TECHNOLOGIES IN STRUCTURAL ENGINEERING

17TH, 18TH, 24TH AND 25TH FEBRUARY 2018

MAHATMA GANDHI MISSION

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About The Department:

1. **Scope & Placement**: - Civil Engineering is a boon in the professional market. There is a huge scope and exposure for the branch nowadays. Thus, the demand for this branch is always full. Also, this branch is also the oldest department in the college, thus has very senior most faculties of Mumbai University. The college has Training and Placement section allotted for successful placement of the students. Every year, T&P section provides recruitment to students in reputed companies. According to the latest report, In future civil engineers are going to have good demands.

   Between 2012 to 2017, there will be the sudden hike of 17% in the roads and bridges every year. Till 2015 Indian roads will be total valued of Rs.1150 Arab. Between 2000 to 2014, the Indian government has invested a lot of money in the construction sector. The money is around Rs.13,000 Crore. Port development like fields has an allowance of good investments. In whole country around 100 smart city are going to build and till 2020 bullet trains are going to start in our country as Narendra Modi speech there will be huge increment in the Public private partnership and in return there will be scope in civil engineering.

2. **HOD & Faculty**: - Civil Engineering Department is the oldest department in the college. We have senior most faculties of Mumbai University in our college. The HOD of the department has 27 years of experience in teaching profession. Along with this, we also have other two faculties with an experience more than 25 years. The department also has faculty with 35 years experience in industry which helps the students to explore Site Knowledge to the fullest.

   Apart from this, the department has a total of 20 number of faculty working as Assistant Professor having specialization in respective streams of Engineering like Structural Engineering, Construction Management Engineering, Geo-Technical Engineering, Transportation Engineering, etc.

3. **Major Facilities**: - As the department is the oldest department, the laboratories are equipped with a lot of apparatus. We also have a Post Graduation course in Structural Engineering (Full Time course). We also have a developed Structural Dynamics Lab having machinery like Vibration Absorber. The Laboratory are also equipped with latest software like Auto-Cad software, Staad Pro software, etc. We provide the students with STAAD Pro Software training along with few industrial examples on RCC structures and Steel Structures. The department has a separate Lab for software training and programming.

4. **Alumni**: - As the department is 27 years old, we have a lot of alumni students working at very good position in Multi-National Agencies. Some alumni students those staying abroad

are also connected with the college. Every year we have an alumni meet in the college where we have an interaction with them. Many of our students, got placed in government sectors like UPSC, MPSC, PMC, BMC, PWD, etc. Recently one of our alumni students got placed as an IES officer in civil services.

5. **Any Other Point**:-The department is well-equipped with Compressive Test Machinery and Aggregate Test Machinery. These machines are used for testing of materials like concrete, course aggregate and fine aggregate. Machinery like Vibration Absorber is used to test the dynamic vibration of the structure, which is further used for stimulation of response history analysis, earthquake analysis and to determine the modal shape of the structure. The department also have software like Auto-Cad and STAAD Pro Software where we can provide training along with few industrial examples on RCC structures and Steel Structures.

About the Institute:

MGM's College of Engineering and Technology (MGMCET) is governed by Mahatma Gandhi Mission, A Charitable Trust, Registered under the Bombay Public Trust Act 1950 and Societies Regulation Act 1860. Since its inception in 1982, Mahatma Gandhi Mission has developed into an excellent educational group and is totally committed to human resource development. MGM has now a chain of Engineering, Medical, Nursing, Management, Dental, Physiotherapy, Science, Journalism and Fine Arts spread over five educational centres - Navi Mumbai, Aurangabad, Nanded, Noida, Parbhani.

The four courses viz. Computer, Bio-medical, Electronics & Telecommunications and Civil are accredited by National Board of Accreditation (NBA). MGMCET is housed in a spacious Campus near Panvel at the junction of NH-4 and Mumbai-Pune Expressway, but in modern style of architecture, best suited to secure the requisite effect of simplicity & dignity which should be associated with a technological institute. It maintains picturesque and lush green gardens around to provide a soothing atmosphere conducive to learning. Admission to the institute is as per the procedure laid down by Directorate of Technical Education, Maharashtra State. Well qualified and experienced teaching faculties are appointed to provide value based quality Technical Education.

Affiliation & Accreditation

- The Courses conducted by MGM College of Engineering & Technology have been approved by the **All India Council for Technical Education, AICTE, New Delhi**.

- The college is affiliated to **University of Mumbai** and many courses conducted by it have been accredited by **National Board of Accreditation (NBA)**.

- The stated mission of MGM College of Engineering & Technology is to empower the aspiring professional students to be prudent enough to explore the world of technology and mould them to be proficient to reach the pinnacle of success in the competitive global economy and it is awarded with **ISO 9001:2000, Certification by RINA** for providing Technical Education in Engineering field as per the guidelines of **University of Mumbai**.
- The college has been awarded with
    - **ISO 9001:2000 Certification by RINA** for contribution to the technical education in the engineering field.
    - **IBM Awarded -** IBM SOFTWARE – CENTER OF EXCELLENCE.
    - **MICROSOFT Awarded** – "Microsoft IT Academy " .
    - **ELITECORE TECHNOLOGIES Awarded** "Cyberoam iVIEW Development Center ".
    - **EMC** Academic Alliance Program Partner.

The Degree Courses provided by the Institute and their annual intake are as follows:

First Shift Courses

Branch	Intake
Computer Engineering	120
Electronics & Telecommunication, Engineering	120
Bio-Medical Engineering	60
Civil Engineering	60
Chemical Engineering	60
Information Technology	60
Biotechnology	60
Mechanical Engineering	60
Electrical Engineering	60

Second Shift Courses

Branch	Intake
Electronics & Telecommunication, Engineering	60
Civil Engineering	60
Mechanical Engineering	60

Post Graduate Courses

Branch	Intake
M.E (Bio-Medical Engineering)	18
M.E(Electronics & Telecommunication, Engineering)	18
BM.E (Civil-Structural Engineering)	18
M.E (Computer Engineering)	18
M.E (Chemical Engineering)	18

Placements:

With the sole aim of providing excellent career opportunities to the students, Training & Placement Cell extends from providing a platform for the interaction between students community and industrial sources to the generation of awareness about the current professional scenario in today's ever-competitive corporate world.

Traning & Placement Cell works under the guidance of the principal and is headed by the Training and Placement officer assisted by faculty members, staff and students.

Activities:

1. Training & Placement Cell acts as a link between industry-institution for faculty and student as well.
2. Training & Placement Cell invites companies for the campus recruitments and provides them with necessary facilities for conducting aptitude tests, group discussions and interviews.
3. Training & Placement Cell also arranges guest lectures of eminent personalities from industry, management and sciences for career counseling, personality development, behavioral development, etiquette training and other edge-cutting program, in addition to gaining first-hand information on the latest trends.

Companies:

J P Morgan, Akstech, Mphasip, Mastek, HCL, TCS, Reliance Commnication, Roche Diagnostics, Enercon, Tricom, L & T, Amdocs, Indian Airforce, Vakpati Ent, Patni Computers, Intarvo Technology, Infosys, CHT, Coherent Medical System, Hexaware, VVF, Sika, Oracle, Mu Sigma, Protech Consulting, Capgemini, Wipro, M.N Dastur, GE, ICICI, IBM, Indian Army, Siemens, Dell, Dipak Fertilizers and may more.

Source Persons :

Dr. R. P. Shimpi

Topic – Shear Deformable Beams

The classical beam/plate theory is not adequate in providing accurate bending, buckling, and vibration results when the thickness-to-length ratio of the beam/plate is relatively large. This is because the effect of transverse shear strains, neglected in the classical theory, becomes significant in deep beams and thick plates. Dr. R. P. Shimpi explained the shear deformation theories provide accurate solutions compared to the classical theory. Equations governing shear deformation theories are typically more complicated than those of the classical theory. Hence it is desirable to have exact relationships between solutions of the classical theory and shear deformation theories so that whenever classical theory solutions are available, the corresponding solutions of shear deformation theories can be readily obtained. Such relationships not only furnish benchmark solutions of shear deformation theories but also provide insight into the significance of shear deformation on the response.

Mr. Girish Rakhunde (Sr. Consultant)

Topic- structural analysis and design of onshore and offshore refinery(oil and gas structure)

The analysis, design and construction of offshore structures is arguably one of the most demanding sets of tasks faced by the engineering profession. Over and above the usual conditions and situations met by land-based structures, offshore structures have the added complication of being placed in an ocean environment where hydrodynamic interaction effects and dynamic response become major considerations in their design. In addition, the range of possible design solutions, such as: ship-like Floating Production Systems, (FPSs), and Tension Leg Platform (TLP) deep water designs; the more traditional jacket and jack-up (space truss like) oil rigs; and the large member sized gravity-style offshore platforms themselves (see Fig. 1), pose their own peculiar demands in terms of hydrodynamic loading effects, foundation support conditions and character of the dynamic response of not only the structure itself but also of the riser systems for oil extraction adopted by them. Invariably, non-linearity's in the description of the hydrodynamic loading characteristics of the structure-fluid interaction and in the associated structural response can assume importance and need be addressed. Access to specialist modelling software is often required to be able to do so.

Structural analysis is mainly concerned with finding out the behaviour of a physical structure when subjected to force. This action can be in the form of load due to the weight of things such as people, furniture, wind, snow, etc. or some other kind of excitation such as an earthquake, shaking of the ground due to a blast nearby, etc. In essence all these loads are dynamic, including the self-weight of the structure because at some point in time these loads were not there. The distinction is made between the dynamic and the static analysis on the basis of whether the applied action has enough acceleration in comparison to the structure's natural frequency. If a load is applied sufficiently slowly, the inertia forces (Newton's first law of motion) can be ignored and the

analysis can be simplified as static analysis. **Structural dynamics**, therefore, is a type of structural analysis which covers the behaviour of structures subjected to dynamic (actions having high acceleration) loading. Dynamic loads include people, wind, waves, traffic, earthquakes, and blasts. Any structure can be subjected to dynamic loading. Dynamic analysis can be used to find dynamic displacements, time history, and modal analysis.

A dynamic analysis is also related to the inertia forces developed by a structure when it is excited by means of dynamic loads applied suddenly (e.g., wind blasts, explosion, earthquake).

A static load is one which varies very slowly. A dynamic load is one which changes with time fairly quickly in comparison to the structure's natural frequency. If it changes slowly, the structure's response may be determined with static analysis, but if it varies quickly (relative to the structure's ability to respond), the response must be determined with a dynamic analysis.

Dynamic analysis for simple structures can be carried out manually, but for complex structures finite element analysis can be used to calculate the mode shapes and frequencies

Dr. K.K. Sangle

Topic – Fundamentals of Structural Engineering

An understanding of mechanical physics, culminating in the study of Statics (aka how forces move through structures to get to supports).

- Possibly an understanding of dynamics to analyze how dynamic forces affect structures (although, the building code often simplifies these into static equivalent forces).

- An understanding of material mechanics, especially the relationship between stress and strain, and how that translates into displacement and forces as well as the physics of nature such as the effects of wind, water and snow on buildings, the effects of gravity and the effects of the weight of the structure itself. In addition to the physics affecting a structure, they also study the known longevity of materials and their impact on the environment

Mr. Hemant Vadalkar

Topic- Computer Aided Analysis And Design of Building Using STAAD Pro

The resources information involves analysis and design of multi-storeyed [G + 21] using a very popular designing software STAAD Pro. We have chosen STAAD Pro because of its following advantages: -Easy to use interface, -Conformation with the Indian Standard Codes, -Versatile nature of solving any type of problem, -Accuracy of the solution. STAAD Pro features a state-of-the-art user interface, visualization tools, powerful analysis and design engines with advanced finite element and dynamic analysis capabilities. From model generation, analysis and design to visualization and result verification, STAAD Pro is preferred for steel, concrete, timber, aluminium and cold formed steel design of low and high-rise buildings, culverts, petrochemical

plants, tunnels, bridges, piles and much more. To start with we have solved some sample problems using STAAD Pro and checked the accuracy of the results

Dr. Abhay Bambole

Topic: Structural Health Monitoring.

Civil engineering infrastructure is generally the most expensive national investment and asset of any country. In addition, civil engineering structures have long service life compared with other commercial products, and they are costly to maintain and replace once they are erected . Further, there are few prototypes in civil engineering, and each structure leads to be unique in terms of materials, design, and construction. The most important structures include bridges, high-rise buildings, power utilities, nuclear power plants, and dams. All civil structures age and deteriorate with time. The deterioration is mostly the result of aging of materials, continuous use, overloading, aggressive exposure conditions, lack of sufficient maintenance, and difficulties encountered in proper inspection methods. All of these factors contribute to material and structural degradation as internal and external damages emerge and coalesce, and then evolve and progress.

To ensure structural integrity and safety, civil structures have to be equipped with Structural Health Monitoring (SHM), which aims to develop automated systems for the continuous monitoring, inspection, and damage detection of structures with minimum labour involvement. An effective SHM system can in real time, and online, detect various defects and monitor strain, stress, and temperature so that the optimum maintenance of the structures can be carried out to ensure safety and durable service life. In general, a typical SHM system includes three major components: a sensor system, a data processing system (including data acquisition, transmission, and storage), and a health evaluation system (including diagnostic algorithms and information management). The first step to set up this system is to incorporate a level of stable and reliable structural sensing capability. So, this paper is mainly related to the first component of the SHM system: the sensing system formed by smart materials/sensors. Smart materials/sensors, such as fibre optic sensors (FOS), piezoelectric sensors, magneto structure sensors, and self-diagnosing fibre reinforced structural composites; possess very important capabilities of sensing various physical and chemical parameters related to the health of the structures.

Dr. Mrs. Tanuja P.Bandivadekar

Topic: Wind Analysis on Tall Structure.

Wind engineering is a subsets of mechanical engineering, structural engineering, meteorology, and applied physics to analyse the effects of wind in the natural and the built environment and studies the possible damage, inconvenience or benefits which may result from wind. In the field of engineering it includes strong winds, which may cause discomfort, as well as extreme winds, such

as in a tornado, hurricane or heavy storm, which may cause widespread destruction. In the fields of wind energy and air pollution it also includes low and moderate winds as these are relevant to electricity production resp. dispersion of contaminants.

Wind engineering draws upon meteorology, fluid dynamics, mechanics, geographic information systems and a number of specialist engineering disciplines including aerodynamics, and structural dynamics. The tools used include atmospheric models, atmospheric boundary layer wind tunnels, open jet facilities and computational fluid dynamics models.

Wind engineering involves, among other topics:

- Wind impact on structures (buildings, bridges, towers).
- Wind comfort near buildings.
- Effects of wind on the ventilation system in a building.
- Wind climate for wind energy.
- Air pollution near buildings.

Wind engineering may be considered by structural engineers to be closely related to earthquake engineering and explosion protection.

Mr. Rajesh Kumar (Sr. Consultant)

Topic: Ground Consolidation using Prefabricated Vertical Drains

Vertical drains are generally installed in either triangular or square patterns. νThe consolidation problem is simplified to an axisymmetric one in most vertical drain consolidation theories, in which a drain well is enclosed by a cylinder of soil. An equivalent radius of the soil cylinder based on the same total area for different installation patterns is used in the analysis.

The prefabricated band drains are used for accelerating the consolidation of marine deposits or soft soils. ν In general, prefabricated band drains consist of a central core, whose function is primarily to act as a free drainage channel, and a non-woven filter jacket, which prevents the soil surrounding the drain from entering the central core but allows water to flow in. νBand drain is commonly used because of its easy prefabrication, easy quality control, economy and small disturbance to the surrounding soil during installation.

Mr. Vivek Mamdapur

Topic: Design of Flexible Pavement

Flexible pavements are so named because the total pavement structure deflects, or flexes, under loading. A flexible pavement structure is typically composed of several layers of materials. Each layer receives loads from the above layer, spreads them out, and passes on these loads to the next layer below. Thus the stresses will be reduced, which are maximum at the top layer and minimum on the top of subgrade. In order to take maximum advantage of this property, layers are usually arranged in the order of descending load bearing capacity with the highest load bearing capacity

material (and most expensive) on the top and the lowest load bearing capacity material (and least expensive) on the bottom.

Empirical design an empirical approach is one which is based on the results of experimentation or experience. Some of them are either based on physical properties or strength parameters of soil subgrade. An empirical approach is one which is based on the results of experimentation or experience. An empirical analysis of flexible pavement design can be done with or with out a soil strength test. An example of design without soil strength test is by using HRB soil classification system, in which soils are grouped from A-1 to A-7 and a group index is added to differentiate soils within each group. Example with soil strength test uses McLeod, Stabilometer, California Bearing Ratio (CBR) test. CBR test is widely known and will be discussed.

Mechanistic-Empirical Design Empirical-Mechanistic method of design is based on the mechanics of materials that relates input, such as wheel load, to an output or pavement response. In pavement design, the responses are the stresses, strains, and deflections within a pavement structure and the physical causes are the loads and material properties of the pavement structure. The relationship between these phenomena and their physical causes are typically described using some mathematical models. Along with this mechanistic approach, empirical elements are used.

Contents

5.Programme (Date-wise)

Day/ Date	*Time*	*Programme*	*Source Person*	*Topic*
DAY 01 SATURDAY 17-02-2018	9:30 am to 10:00 am	Registration		
	10:00 am to 10:30 am	Inauguration		
	10:30 am to 12:30 pm	Session 1	Dr.R.P.Shimpi	Shear Deformable Beam
	12:30 pm to 02:00 pm	Lunch Break		
	02:00 am to 04:00 pm	Session 2	Mr.Girish Rakhonde (Sr.Consultant)	Structural Analysis and Design of Onshore and Offshore Refinery (Oil and Gas) Structures.
DAY 02 SUNDAY 18-02-2018	10:30 am to 12:30 pm	Session 1	Dr.K.K.Sangle	Fundamental of Structural Engineering
	12:30 pm to 02:00 pm	Lunch Break		
	02:00 am to 04:00 pm	Session 2	Mr.Hemant Vadalkar	Computer Aided Analysis and Design of Building using STAAD Pro.
DAY 03 SATURDAY 24-02-2018	10:30 am to 12:30 pm	Session 1	Prof. Vivek Mamdapurkar	Design of flexible and rigid pavement
	12:30 pm to 02:00 pm	Lunch Break		
	02:00 am to 04:00 pm	Session 2	Dr.Tanuja P.Bandivadekar	Wind analysis on tall buildings
DAY 04 SUNDAY 25-02-2018	10:30 am to 12:30 pm	Session 1	Mr.Rajesh Kumar (Sr.Consultant)	Ground consolidation using PVD
	12:30 pm to 02:00 pm	Lunch Break		
	02:00 am to 04:00 pm	Session 2	Dr.Abhay Bambole	Structural Health Monitoring

Executive Summary

Dr.R.P.Shimpi is Proffesor at Aerospace Engineering department in IIT Mumbai. Dr.Shimpi has covered the Theory of Shear deformable beams. The classical beam/plate theory is not adequate in providing accurate bending, buckling, and vibration results when the thickness-to-length ratio of the beam/plate is relatively large. This is because the effect of transverse shear strains, neglected in the classical theory, becomes significant in deep beams and thick plates. Dr. R. P. Shimpi explained the shear deformation theories provide accurate solutions compared to the classical theory. Equations governing shear deformation theories are typically more complicated than those of the classical theory.

He also explained the relationships of bending solution between Timoshenko beams & Euler's Bernoulli's beams are derived for uniform & non uniform beam with elastic rotationally restrained ends. Extensions of these relationships for this cylindrical bending of Mindlin & Kirchhoff's plates & for the bending of symmetrically laminated beams are also discussed. The new set of general relationship is useful because the more complex Timoshenko beam & Mindlin plate solutions may be readily obtained from their simpler Euler-Bernoulli beam & Kirchhoff's plate solutions respectively without much steady mathematics.

The classical beam/plate theory is not adequate in providing accurate bending, buckling, and vibration results when the thickness-to-length ratio of the beam/plate is relatively large. This is because the effect of transverse shear strains, neglected in the classical theory, becomes significant in deep beams and thick plates. Dr. R. P. Shimpi explained the shear deformation theories provide accurate solutions compared to the classical theory. Equations governing shear deformation theories are typically more complicated than those of the classical theory. Hence it is desirable to have exact relationships between solutions of the classical theory and shear deformation theories so that whenever classical theory solutions are available, the corresponding solutions of shear deformation theories can be readily obtained. Such relationships not only furnish benchmark solutions of shear deformation theories but also provide insight into the significance of shear deformation on the response.

Mr. Girish Rokhonde has covered the structural analysis and design of oil and gas onshore and offshore structures. He has explained how to calculate the design load for equipment foundation and loading of pipe rack.

The analysis, design and construction of offshore structures are arguably one of the most demanding sets of tasks faced by the engineering profession. Over and above the usual conditions and situations met by land-based structures, offshore structures have the added complication of being placed in an ocean environment where hydrodynamic interaction effects and dynamic response become major considerations in their design. In addition, the range of possible design solutions, such as: ship-like Floating Production Systems, (FPSs), and Tension Leg Platform (TLP) deep water designs; the more traditional jacket and jack-up (space truss like) oil rigs; and the large member sized gravity-style offshore platforms themselves (see Fig. 1), pose their own peculiar demands in terms of hydrodynamic loading effects, foundation support conditions and character of the dynamic response of not only the structure itself but also of the riser systems for oil extraction adopted by them. Invariably, non-linearity's in the description of the hydrodynamic loading characteristics of the structure-fluid interaction and in the associated structural response can assume importance and need be addressed. Access to specialist modelling software is often required to be able to do so.

Structural analysis is mainly concerned with finding out the behaviour of a physical structure when subjected to force. This action can be in the form of load due to the weight of things such as people, furniture, wind, snow, etc. or some other kind of excitation such as an earthquake, shaking of the ground due to a blast nearby, etc.

He has also explained dynamic analysis is also related to the inertia forces developed by a structure when it is excited by means of dynamic loads applied suddenly (e.g., wind blasts, explosion, and earthquake).

A static load is one which varies very slowly. A dynamic load is one which changes with time fairly quickly in comparison to the structure's natural frequency. If it changes slowly, the structure's response may be determined with static analysis, but if it varies quickly (relative to the structure's ability to respond), the response must be determined with a dynamic analysis.

Dynamic analysis for simple structures can be carried out manually, but for complex structures finite element analysis can be used to calculate the mode shapes and frequencies

Dr. K.K.Sangle is a well knowing Professor from Veermata Jijabai Technological Institute, Mumbai. He has covered the basic fundamental on structural engineering such as excitation force, static and dynamic, material properties (behavior of material) elastic or plastic, response of structure linear or non-linear under static loading. Under dynamic loading, inelastic, linear or nonlinear, stiffness of the structure about dynamic equilibrium equation, Duhamel equation, stress strain relationship.

As the guidance given by Sir was really helpful in understanding the purpose of structural engineering. Firstly Sir started teaching us about Structural engineering & different aspects involved in the field.

Sir also explained us about the different types of analysis used in structural engineering such as Static analysis, Dynamic Analysis, Elastic & Inelastic analysis, Linear & Non-linear analysis. He also discussed about different loadings like Dead Load, Live Load, Earthquake/Seismic Loads, Wind loads etc. & its effect on structure & its stability.

Sir also explained us & gave us knowledge of different material properties of structure like elastic & inelastic. He also explained various components in structure in great depth viz; Supports, Degrees of freedom, restrains etc. Different response of structure like Static linear, Static nonlinear, Dynamic linear, Dynamic non linear were also discussed.

Possibly an understanding of dynamics to analyse how dynamic forces affect structures (although, the building code often simplifies these into static equivalent forces). An understanding of material mechanics, especially the relationship between stress and strain, and how that translates into displacement and forces as well as the physics of nature such as the effects of wind, water and snow on buildings, the effects of gravity and the effects of the weight of the structure itself. In addition to the physics affecting a structure, they also study the known longevity of materials and their impact on the environment

Mr. Wadalkar has explain the Staad Pro software how to generate the model of multistoried building used the different command for assigning the properties to the member of structure, to assign the load cases like Dead Load, Live Load, Wind Load, Moving Load, Seismic Load, Time History with the help of load generation command. Again he has explained response spectrum analysis method. He also explained shear wall modelling.

The resources information involves analysis and design of multi-storeyed [G + 21] using a very popular designing software STAAD Pro. We have chosen STAAD Pro because of its following advantages: -Easy to use interface, -Conformation with the Indian Standard Codes, -Versatile nature of solving any type of problem, -Accuracy of the solution. STAAD Pro features a state-of-the-art user interface, visualization tools, powerful analysis and design engines with advanced finite element and dynamic analysis capabilities. From model generation, analysis and design to visualization and result verification, STAAD Pro is preferred for steel, concrete, timber, aluminium and cold formed steel design of low and high-rise buildings, culverts, petrochemical plants, tunnels, bridges, piles and much more. To start with we have solved some sample problems using STAAD Pro and checked the accuracy of the results

STAAD Pro is a tool for helping an Engineer in the lengthy process of analysing, basic engineering must be cleared to use these software's just gives output to whatever is given to it. Like the say GARBAGE IN, GARBAGE OUT.

Various processes of modelling the structure were explained to us, how a model should be, what basic form of structures are. Appropriate loading must be done so that the structure is not over designed or under designed.

Various checks explained in modelling are as follows

- Check for Multiple Structure: All members must well connected with each other for form a single structure.
- Orphan nodes, beams: There must not be any unattained node or beam in a structure.
- Overlapping: There must not be overlapping on beams (members) on each other.

All these points must be taken care of.

Dr. Tanuja P. Bandivadekar has delivered the lecture on wind analysis for multistoried building, necessities of wind engineering, static, dynamic and aerodynamics methods. She explained regarding randomly varying phenomenon like gust, vortex shedding, buffeting, galloping etc. And effects of wind on building, overturning effect, torsioning effect.

Wind engineering is a subsets of mechanical engineering, structural engineering, meteorology, and applied physics to analyse the effects of wind in the natural and the built environment and studies the possible damage, inconvenience or benefits which may result from wind. In the field of engineering it includes strong winds, which may cause discomfort, as well as extreme winds, such as in a tornado, hurricane or heavy storm, which may cause widespread destruction. In the fields of wind energy and air pollution it also includes low and moderate winds as these are relevant to electricity production resp. dispersion of contaminants.

Wind engineering draws upon meteorology, fluid dynamics, mechanics, geographic information systems and a number of specialist engineering disciplines including aerodynamics, and structural dynamics. The tools used include atmospheric models, atmospheric boundary layer wind tunnels, open jet facilities and computational fluid dynamics models.

- Wind engineering involves, among other topics:
- Wind impact on structures (buildings, bridges, towers).
- Wind comfort near buildings.
- Effects of wind on the ventilation system in a building.
- Wind climate for wind energy.
- Air pollution near buildings.

Wind engineering may be considered by structural engineers to be closely related to earthquake engineering and explosion protection.

Mr. Rajesh Kumar has explained ground consideration using PVD (Pre Fabricating Vertical Drain). He also explained difference between compaction and consolidation fundamental pressure in soil.

Vertical drains are generally installed in either triangular or square patterns. The consolidation problem is simplified to an axisymmetric one in most vertical drain consolidation theories, in which a drain well is enclosed by a cylinder of soil. An equivalent radius of the soil cylinder based on the same total area for different installation patterns is used in the analysis.

The prefabricated band drains are used for accelerating the consolidation of marine deposits or soft soils. In general, prefabricated band drains consist of a central core, whose function is primarily to act as a free drainage channel, and a non-woven filter jacket, which prevents the soil surrounding the drain from entering the central core but allows water to flow in. Band drain is commonly used because of its easy prefabrication, easy quality control, economy and small disturbance to the surrounding soil during installation.

The loads are applied on clay & pit layers the poor permeability of the layers can lead to perched pore water. If no measured are taken these perched pore water gradually flows away & will slowly alter the settlement this can also lead to possible stability problems. If embankment construction takes place PVD system consist of plastic strip drain which is installed vertically from ground layer to desired depth. This cause's vertical drainage path in the subsoil, considerably reducing the flow path of perched water as a result consolidated process can be reduced from decade to six month or less & increasing stability is accelerated, meaning that embankment construction can take place more quickly

The application areas for PVD are

- Soil improvement of residential or construction areas
- The construction of infrastructure (Roads, Railways, Harbors, Airport)
- Construction of dykes
- Land Reclamation projects.

Dr. Bambole has delivered regarding the new techniques & equipment's for the measurements of deflections of bridges & explain regarding the different types of strain gauges.

Civil engineering infrastructure is generally the most expensive national investment and asset of any country. In addition, civil engineering structures have long service life compared with other commercial products, and they are costly to maintain and replace once they are erected . Further, there are few prototypes in civil engineering, and each structure leads to be unique in terms of materials, design, and construction. The most important structures include bridges, high-rise buildings, power utilities, nuclear power plants, and dams. All civil structures age and deteriorate with time. The deterioration is mostly the result of aging of materials, continuous use, overloading, aggressive exposure conditions, lack of sufficient maintenance, and difficulties encountered in proper inspection methods. All of these factors contribute to material and structural degradation as internal and external damages emerge and coalesce, and then evolve and progress.

To ensure structural integrity and safety, civil structures have to be equipped with Structural Health Monitoring (SHM), which aims to develop automated systems for the continuous monitoring, inspection, and damage detection of structures with minimum labour involvement. An effective SHM system can in real time, and online, detect various defects and monitor strain, stress, and temperature so that the optimum maintenance of the structures can be carried out to ensure safety and durable service life. In general, a typical SHM system includes three major components: a sensor system, a data processing system (including data acquisition, transmission, and storage), and a health evaluation system (including diagnostic algorithms and information management). The first step to set up this system is to incorporate a level of stable and reliable structural sensing capability. So, this paper is mainly related to the first component of the SHM system: the sensing system formed by smart materials/sensors. Smart materials/sensors, such as fibre optic sensors (FOS), piezoelectric sensors, magneto structure sensors, and self-diagnosing fibre reinforced structural composites; possess very important capabilities of sensing various physical and chemical parameters related to the health of the structures.

Mr Vivek Mamdapur has explain regarding flexible parameters, design wheel load calculation, maximum wheel loads, equivalent single wheel load. He has explain about failure of flexible pavements relating to aligater or map cracking, failure cracking, longitudinal cracking, frost cracking and deflection cracking. He also explained regarding design of flexible pavement. And design of flexible pavement was discussed as per explained in IS code 37:2012 with case studies, practical problems in or around New Mumbai and Mumbai. The solution of pot hole was discussed compared with the response of engineering with the students.

Flexible pavements are so named because the total pavement structure deflects, or flexes, under loading. A flexible pavement structure is typically composed of several layers of materials. Each layer receives loads from the above layer, spreads them out, and passes on these loads to the next layer below. Thus the stresses will be reduced, which are maximum at the top layer and minimum on the top of subgrade. In order to take maximum advantage of this property, layers are usually arranged in the order of descending load bearing capacity with the highest load bearing capacity material (and most expensive) on the top and the lowest load bearing capacity material (and least expensive) on the bottom.

Empirical design an empirical approach is one which is based on the results of experimentation or experience. Some of them are either based on physical properties or strength parameters of soil subgrade. An empirical approach is one which is based on the results of experimentation or experience. An empirical analysis of flexible pavement design can be done with or with out a soil strength test. An example of design without soil strength test is by using HRB soil classification system, in which soils are grouped from A-1 to A-7 and a group index is added to differentiate soils within each group. Example with soil strength test uses McLeod, Stabilometer, California Bearing Ratio (CBR) test. CBR test is widely known and will be discussed.

Mechanistic-Empirical Design Empirical-Mechanistic method of design is based on the mechanics of materials that relates input, such as wheel load, to an output or pavement response. In pavement design, the responses are the stresses, strains, and deflections within a pavement structure and the physical causes are the loads and material properties of the pavement structure. The relationship between these phenomena and their physical causes are typically described using some mathematical models. Along with this mechanistic approach, empirical elements are used.

Introduction

Academic education remains insufficient if not collaborated with industrial knowledge and practical skill set. The Civil Department of MGMCET believes in bridging the gap between theory and practice of the technology that is studied and applied in the world of construction and infrastructure. With the aim to acquaint students of Civil Engineering with on-site experience and make them aware of the recent trends in the field, a 4 – day workshop was organized the Department on the 17th, 18th, 24th and 25th of February.

Renowned scholars and industrial experts were invited to conduct seminar on topics varying from structural components to structural soft wares; which would increase the students' perspective to the growing and changing technology. Dr. R. P. Shimpi explained the students the new advances on "Shear Deformable Beam". Design and analysis of structures is impossible without computer aid. Mr. Girish gave the students an overview of "Structural analysis and design of Onshore and Off-shore refinery". Students were explained about the "Fundamental of structural Engineering" by Dr. K. K. Sangle. "Computer aided analysis and design of building using STAADPRO" by Mr. Hemant Vadalkar added to the students knowledge on structural designing softwares. Many more topics were covered and enhanced the students knowledge. The workshop in itself was a complete package of knowledge and experience.

Objective

The workshop aimed at enlightening students on worldwide advances in the field of civil engineering. The workshop was designed in a way topics were built up one upon the other. The seminars conducted unfolded in a way to increase students' technical aptitude on civil engineering subjects. Every single topic brought new understanding to students' knowledge of the subject.

Detailed Report With Photographs

DAY 01 SATURDAY 17-02-2018

Session II Dr.R.P.Shimpi

Session II Mr.Girish Rakhonde (Sr.Consultant)

DAY 02 SUNDAY 18-02-2018

Session I Dr.K.K.Sangle

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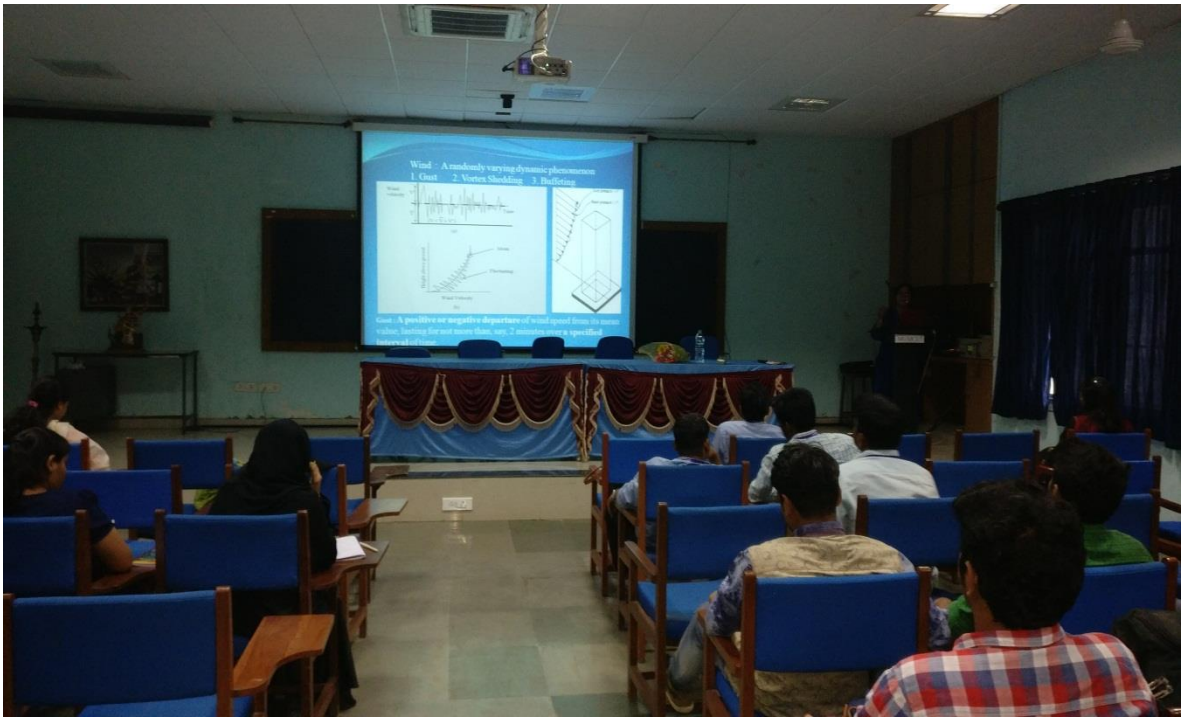
Session II Mr.Hemant Vadalkar AND Mrs. Vadalkar

DAY 03 SATURDAY 24-02-2018

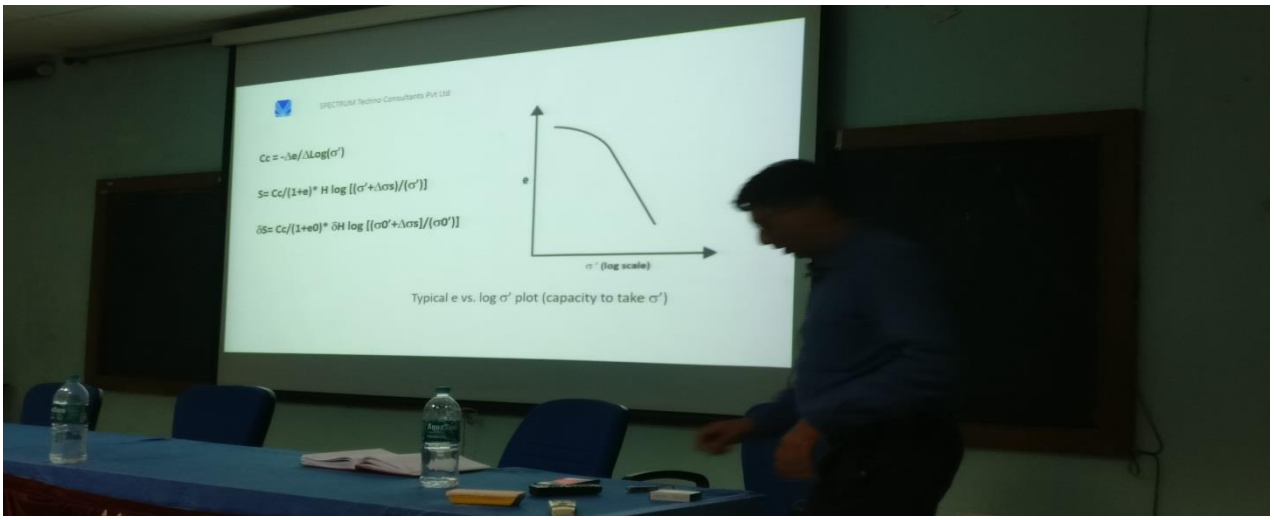
Session I Prof. Vivek Mamdapurkar

Session II Dr.Tanuja P.Bandivadekar



DAY 04 SUNDAY 25-02-2018

Session I Mr.Rajesh Kumar(Sr.Consultant)



Session II Dr.Abhay Bambole


Structural Health Monitoring

List of Guest Speakers With Their C.V.& Photograph:

Sr.No	*Name of the Guest*	*Information*	*Photograph*
1	Dr.R.P.Shimpi	Professor Department of Aerospace Engineering Indian Institute of Technology ,Mumbai	
2	Mr.Girish Rakhonde	Sr.Consultant B.E. (Civil), M.E. (Structures), M.I.E, Chartered Engineer Founder of CNSES Global, Company	
3	Dr.K.K.Sangle	Professor & Dean Academics V.J.T.I.Mumbai.	
4	Mr.Hemant Vadalkar	Civil Engineering Professional Vadalkar & Associates	
5	Prof. Vivek Mamdapurkar	Indian Institute of Technology ,Mumbai	
6	Dr.Tanuja P.Bandivadekar	Prof. At Mukesh Patel School of Technology Management And Engineering	
7	Mr.Rajesh Kumar	Sr.Geotech Consultant	
8	Dr. Abhay Bambole	Professor and Head of the Structural Engineering Department, VJTI, Mumbai.	

EXPENDITURE STATEMENT FOR WORKSHOP

Receiving amount

Total Participant =43 X 500 = **21500/-**

Sr, No	**Date**	**Item**	**Rate (Rs)**
1	16/2/18	Bamboo Plant	300
2	16/2/18	Long Books	240
3	16/2/18	Bamboo Plant	300
4	16/2/18	Cells	50
5	17/2/18	Long Books	720
6	17/2/18	Marker Pen	25
7	17/2/18	Water Bottles	50
8	17/2/18	Match Box, Oil, Agarbatti Etc.	50
9	17/2/18	Auto Charge M.G.M – Panvel Panvel - M.G.M	200
10	17/2/18	Veg Grilled Sandwich	40
11	17/2/18	Tea	10
12	18/2/18	Tea	100
13	18/2/18	Food	140
14	17/2/18	Food	190
15	17/2/18	Taxi Fare – For Prof. Shimpi	1570
16	24/2/18	Bamboo Plant	520
17	24/2/18	Water Bottle	40
18	24/2/18	Maala, Paper Etc	80
19	24/2/18	Auto Charge M.G.M - Panvel	50
20	17/2/18	Bamboo Plant	240
21	17/2/18	Water Bottle	50
22	17/2/18	Auto Charge M.G.M – Panvel Panvel – M.G.M	100
		TOTAL AMOUNT	**5065**

Remunerations for Speaker’s = 3500 x 7 = **24500**

Remuneration for Speaker = 3500 x 1 = **3500**

Total Amount in Rupees = 5065 + 24500 + 3500 = **33065**