





# ACS COLLEGE OF ENGINEERING

#207, Kambipura, Mysore Road, Bengaluru-74



## TEQIP1.3

*Sponsored 5 Days Programme*

*on*

## **“OUTCOME BASED EDUCATION AND NBA ACCREDITATION”**

**6<sup>th</sup> to 10<sup>th</sup> January 2020**

*In association with*



**VISVESVARAYA  
TECHNOLOGICAL  
UNIVERSITY**

*Organized by*

**Department of Mechanical Engineering**

**FIVE DAYS FACULTY DEVELOPMENT PROGRAM**  
**ON**  
**“OUTCOME BASED EDUCATION & NBA ACCREDIATION”**  
**SPONSORED BY VTU TEQIP1.3**

**About the Programme:**

Department of Mechanical Engineering organized **FIVE DAYS FACULTY DEVELOPMENT PROGRAM ON “OUTCOME BASED EDUCATION & NBA ACCREDIATION” SPONSORED BY VTU TEQIP1.3** on 6<sup>th</sup> TO 10<sup>th</sup> JANVARY 2020. The inauguration was held at ACS seminar hall 2<sup>nd</sup> floor from 10.00 am to 11:00 am. The dignitaries on the dais present were: President of the event Dr. M.S. Murali, Principal, ACSCE, Chief Guest Dr. Manjunath, Executive Council Member, VTU-Belagavi Principal, New Horizon College of Engineering, Bangalore, Dr. Siddesha H S, Head of the Department, Mechanical engineering, Dr. Suresh P M, Professor, PG coordinator and R&D and Dr. S Selvanandan, Preofessor & HOD Physics Department, ACSCE.

The flow of the Event is as follows:

The Program started with an Invocation song by Mr. Hemanth, Asst. Professor, Biomedical Engineering Department, followed by Lighting of the lamp by the dignitaries and welcome speech by Dr. H S Siddesha, Head of the Department, Mechanical Engineering, Mr. Sunilraj B A, Asst. Professor, Department of Mechanical engineering explain about the **FIVE DAYS FACULTY DEVELOPMENT PROGRAM ON “OUTCOME BASED EDUCATION & NBA ACCREDIATION” SPONSORED BY VTU TEQIP1.3**

Dr. M.S. Murali, Principal, delivered the presidential address to the gathering, Dr. Suresh P M , introduce the chief Guest Dr. B Manjunath, Executive Council Member, VTU, Principal, New Horizon College of Engineering, Bangalore. Chief Guest addressed the gathering with topics i.e OBE(Outcome Base Education), What, Why and How OBE related with NBA, Finally to create the Global Standards for imparting the Engineering Field to meet the current and future challenges of Technology development. Session concluded with vote of thank by Dr. S Selvanandan, Preofessor & HOD Physics Department.





Lighting of Lamp by Chief Guest



Lighting of Lamp by HOD ME



Lighting of Lamp by Principal



Lighting of Lamp by Participant



Lighting of Lamp by Coordinators



Invocation by Mr. Hementh Kumar





Introduction of Chief Guest by Dr. Suresh P. M.



Chief Guest Addressing the Participants



Chief Guest Addressing the Participants



Principal Addressing the Participants

**ACS College of Engineering**  
**207, Kambipura, Mysore Road, Bengaluru – 560 074**  
**OUTCOME BASED EDUCATION AND NBA ACCREDITATION TRAINING PROGRAM**  
**From 06.01.2020 to 10.01.2020**  
**Schedule of the Program**

|                         | Morning Session                                                                                                                                                                                                                                                         |                          |                                                                                                                                                                                                                                                                                                                                                 |                       | Afternoon Session                                                                                                                                                                                                                                        |                              |                                                                                                                                                                                                                                                                     |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Date/Day                | 09.30am – 11.00am                                                                                                                                                                                                                                                       | 11.00am<br>to<br>11.15am | 11.15 am - 12.45pm                                                                                                                                                                                                                                                                                                                              | 12.45 –<br>2.00P<br>M | 02.00pm – 03.30pm                                                                                                                                                                                                                                        | 03.30<br>pm –<br>03.45<br>pm | 03.45pm – 05.15pm                                                                                                                                                                                                                                                   |
| 06.01.2020<br>Monday    | Registration & Inaugural<br>Function                                                                                                                                                                                                                                    | Tea Break                | <u>Session 1</u><br>Introduction to OBE ·<br>Overview of NBA ·<br>Competency Matrix · Subject<br>Proficiency Matrix<br><b>Dr. M N Gupta</b><br>Vice Principal<br>Sri Venkateshwara College<br>of Engineering<br>9843255706,<br>viceprincipal@svcengg.edu.<br>in                                                                                 | Lunch Break           | <u>Session – 2</u><br>Criterion 1, 2 and 3 Preparation<br>(With Live data)<br><b>Dr. M N Gupta</b><br>Vice Principal<br>Sri Venkateshwara College of<br>Engineering<br>9843255706,<br>viceprincipal@svcengg.edu.in                                       | Tea Break                    | <u>Session – 3</u><br>Criterion 1, 2 and 3 Preparation (With Live<br>data) · Rubrics · Practice Session (With live<br>data)<br><b>Dr. M N Gupta</b><br>Vice Principal<br>Sri Venkateshwara College of<br>Engineering<br>9843255706,<br>viceprincipal@svcengg.edu.in |
| 07.01.2020<br>Tuesday   | <u>Session – 4</u><br>Blooms Taxonomy · Course Outcome<br>Attainment and assessment tool ·<br>Practice Session (With live data)<br><b>Dr. M N Gupta</b><br>Vice Principal<br>Sri Venkateshwara College of<br>Engineering<br>9843255706,<br>viceprincipal@svcengg.edu.in |                          | <u>Session – 5</u><br>Various Assessment techniques<br>· Direct Assessment o Questions<br>paper preparation · Indirect<br>Assessment o Course Exit<br>Survey · Practice Session (With<br>live data)<br><b>Dr. M N Gupta</b><br>Vice Principal<br>Sri Venkateshwara College<br>of Engineering<br>9843255706,<br>viceprincipal@svcengg.edu.<br>in |                       | <u>Session –6</u><br>CO attainment from direct and<br>indirect assessment · Practice<br>Session (With live data)<br><b>Dr. M N Gupta</b><br>Vice Principal<br>Sri Venkateshwara College of<br>Engineering<br>9843255706,<br>viceprincipal@svcengg.edu.in |                              | <u>Session – 7</u><br>PO attainment o Direct o Indirect<br>(Programme Exit Survey) · Practice Session<br>(With live data)<br><b>Dr. M N Gupta</b><br>Vice Principal<br>Sri Venkateshwara College of<br>Engineering<br>9843255706,<br>viceprincipal@svcengg.edu.in   |
| 08.01.2020<br>Wednesday | <u>Session – 8</u><br><u>Innovative Practices in</u><br><u>Academic</u><br><b>Dr.Subramaniya K N</b><br>Principal, R V College of<br>Engineering<br>9663699299                                                                                                          |                          | <u>Session – 9</u><br><u>Innovative Practices in</u><br><u>Academic</u><br><b>Dr.Subramaniya K N</b><br>Principal, R V College of<br>Engineering<br>9663699299                                                                                                                                                                                  |                       | <u>Session – 10</u><br><u>Issue of Outcome Based</u><br><u>Education</u><br><b>Dr.Ravi Kumar L</b><br>Professor, Dept. of Mechanical<br>Engineering<br>BMS College of Engineering<br>Bangalore                                                           |                              | <u>Session – 11</u><br><u>Issue of Outcome Based Education</u><br><b>Dr.Ravi Kumar L</b><br>Professor, Dept. of Mechanical<br>Engineering<br>BMS College of Engineering<br>Bangalore                                                                                |

| Date/Day               | 09.30am – 11.00am                                                                                                                                                                                                                                                                                                           | 11.00am<br>to<br>11.15am | 11.15 am - 12.45pm                                                                                                                                                                                                                                                                                                       | 12.45 –<br>2.00P<br>M | 02.00pm – 03.30pm                                                                                                                                                                                                                                                                                     | 03.30pm<br>–<br>03.45pm | 03.45pm – 05.15pm                                                                                                                                                                                                                                                                                   |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 09.01.2020<br>Thursday | <b><u>Session – 12</u></b><br><b>Measuring program outcomes and course outcomes</b><br><b>Mr. Vinay M Havalad</b><br>Senior Product Specialist ,<br>IonIdea Pvt Limited,<br>Bengaluru<br><a href="mailto:vinay.havalad@ionidea.com">vinay.havalad@ionidea.com</a> ;<br><a href="http://www.ionidea.com">www.ionidea.com</a> | Tea<br>Break             | <b><u>Session – 13</u></b><br><b>Measuring program outcomes and course outcomes</b><br><b>Mr. Vinay M Havalad</b><br>Senior Product Specialist ,<br>IonIdea Pvt Limited,<br>Bengaluru<br><a href="mailto:vinay.havalad@ionidea.com">vinay.havalad@ionidea.com</a> ; <a href="http://www.ionidea.com">www.ionidea.com</a> | Lunch<br>Break        | <b><u>Session – 14</u></b><br><b>Measuring program outcomes and course outcomes</b><br><b>Dr. Yogeesh</b><br>Senior Product Specialist ,<br>IonIdea Pvt Limited,<br>Bengaluru<br><a href="mailto:yogesh@ionidea.com">yogesh@ionidea.com</a> ;<br><a href="http://www.ionidea.com">www.ionidea.com</a> | Tea Break               | <b><u>Session – 15</u></b><br><b>Measuring program outcomes and course outcomes</b><br><b>Dr. Yogeesh</b><br>Senior Product Specialist<br>IonIdea Pvt Limited,<br>Bengaluru<br><a href="mailto:yogesh@ionidea.com">yogesh@ionidea.com</a> ;<br><a href="http://www.ionidea.com">www.ionidea.com</a> |
| 10.01.2020<br>Friday   | <b><u>Session – 16</u></b><br><b>"Achieving Vision, Mission of the College/ Dept"</b><br><b>Dr.D H Rao</b><br>Former Dean, VTU, Belagavi<br>9972040344<br><a href="mailto:Dr.raodh@gmail.com">Dr.raodh@gmail.com</a>                                                                                                        |                          | <b><u>Session – 17</u></b><br><b>Research opportunities for young research scholar</b><br><b>Dr.S.Vinoth</b><br>Director-Pongu Ventures Pvt. Ltd.,<br>Chennai<br>9597276648<br><a href="mailto:info@pongu.in">info@pongu.in</a>                                                                                          |                       | <b><u>Session – 18</u></b><br><b>Queries and Discussion</b>                                                                                                                                                                                                                                           |                         | <b>Valedictory Function &amp; Certificate Distribution</b>                                                                                                                                                                                                                                          |

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Session concluded with vote of thank by Dr. S Selvanandan, Preofessor & HOD Physics Department

## **Introduction:**

Outcome-based education, a performance-based approach at the cutting edge of curriculum development, offers a powerful and appealing way of reforming and managing medical education. The emphasis is on the product. In outcome-based education the educational outcomes are clearly and unambiguously specified. These determine the curriculum content and its organization, the teaching methods and strategies, the courses offered, the assessment process, the educational environment and the curriculum timetable. They also provide a framework for curriculum evaluation.

Outcome-based education offers many advantages as a way of achieving this. It emphasises relevance in the curriculum and accountability, and can provide a clear and unambiguous framework for curriculum planning which has an intuitive appeal. It encourages the teacher and the student to share responsibility for learning and it can guide student assessment and course evaluation. What sort of outcomes should be covered in a curriculum, how should they be assessed and how should outcome-based education be implemented are issues that need to be addressed.

## **Objectives**

**The major objectives of this Faculty Development Programme were as follows:**

- To understand what is OUTCOME BASED EDUCATION ?
- Why OUTCOME BASED EDUCATION ?
- To make participants familiar with OUTCOME BASED EDUCATION approaches.
- To understand the OUTCOME BASED EDUCATION and NBA ACCREDIATION

The programme was attended by 66 participants out of whom 40 were external participants (VTU colleges) 26 internal faculties and other colleges , 2 participants were from Kanyakumari. Attendees included Academicians form varied background. While designing the structure of the programme it was kept in mind that there are going to be people from different background that's OBE & NBA as a whole not pertaining to one single field so that maximum can be benefitted out of it. 2 high tea (Morning & Evening) and Lunch was provided to participants daily and one kit was issued to each participant at the time of the registration.

## **Day-1: 06/01/2020; Session-1, Session-2 and Session-3**

**Resource Person: Dr. M. N. Guptha, Vice Principal and Professor, SVCE  
Bangalore**



Dr. M Nageswara Guptha has 19 years of experience in teaching and 3 Years of experience in research. He holds a BE, ME Computer Science and Engineering from Kumaraguru College of Technology and completed his research in PSG college of technology. His area of interest includes Business Intelligence, Service Oriented Computing User Interface Design, Aquaponics, RPA and Robotics.

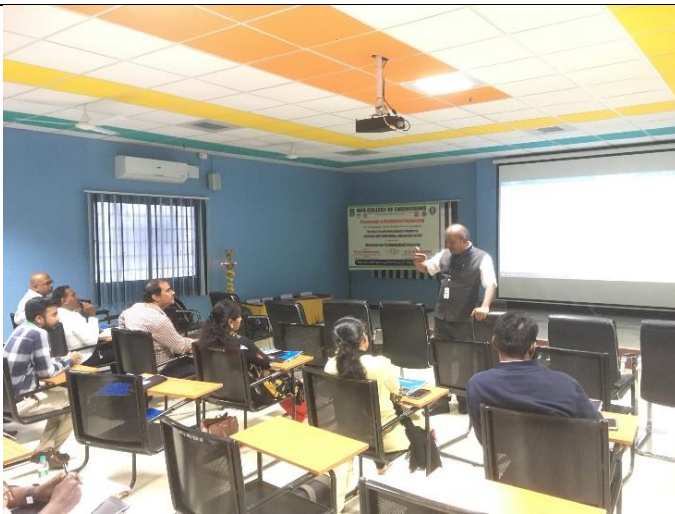
He has prolifically published around 30+ papers in national / international journals and conferences. He has also filed and published 5 patents. He is a Life member of ISTE, ACCS, IAENG, EWB and member of IEEE.

Currently He is working as Vice Principal, Head R & D, Placement Director and Professor in Department of Computer Science and Engineering at Sri Venkateshwara College of Engineering. He has acted as mentor for 15 Tier – II institutions and 8 Tier – I institutions for OBE implementation and NBA accreditation which includes Engineering, Pharmacy and Polytechnic colleges. He is also one among the active resource person for OBE implementation at ESCI.

### **Topic covered:**

- **Introduction to OBE**
- **Overview of NBA**
- **Competency Matrix**
- **Subject Proficiency Matrix**

## Day-1 :Photo gallery



**Day-2: 07/01/2020; Session-4, Session-5, Session-6 and Session-7**

**Resource Person: Dr. M. N. Gupta, Vice Principal and Professor, SVCE**

**Bangalore**

**Topic covered:**

## **Day-2 :Photo gallery**



**Group Photo with Dr. M. N. Gupta**

### **Day-3: 08/01/2020; Session-8 and Session-9**

**Resource Person: Dr. K.N. Subramanya, Principal, RV College of Engineering, Bangalore**

**Topic covered: Innovative Practices in Academic**



Brief Profile: He had early education in Acharya High School and AES National College-Gauribidanur. Then he pursued B.E in Industrial and Production Engineering from Bangalore University, M.Tech in Industrial Management from IITM-Chennai, MBA from Karnataka State Open University-Mysuru, with HR specialization (5<sup>th</sup> Rank) and Ph.D. from Avinashilingam University-Coimbatore. He did his Proficiency Courses on 'Engineering Consultancy Practice and Non-Destructive Testing' from Indian Institute of Science, NPTEL online Certification course on 'Educational Leadership'. Has total 27 years of experience in Teaching, Training & Consultancy, Research and Administration. Having Strong communication and presentation skills, effective collaboration & team building capabilities with zeal to adapt to latest technological and leadership concepts & utilise the same in a productive and effective manner for the progress of the institution.

Presently working as Principal, R V College of Engineering, Bengaluru. Served the Institution in various capacities including Lecturer, Sr. Lecturer, Assistant Professor, Director (Administration), Professor & Head of the Department of IEM and Vice Principal. Worked as Lecturer in the Dept. of Industrial Engineering & Management, Dayananda Sagar College of Engineering-Bengaluru for a period of 4½ years.

Academic and Research expertise includes Lean Manufacturing and Operations Management, Supply Chain and Logistics Management, e-Enterprise Modelling of B2B and B2C Markets,

Simulation Modelling and Analysis, Quality Management, Information System Design, Decision Sciences, Applied Ergonomics, Systems Engineering, Strategic Management and allied Industrial Engineering and Information Technology areas. Has guided more than 100 UG and PG projects.

He has actively involved in Research and guiding 3 Research Scholars under VTU-Belagavi and 1 Research Scholar under Jain University, Published 21 Technical Papers in Refereed International Journals, 17 National Journals, Presented 51 Technical Papers in International Conferences, 26 in National Conferences and Authored chapters in four books. Executed several funded projects, consultancy assignments and co-ordinating the projects worth more than 30 crores at the institution level since two years. Published a Patent titled “Design and Development of Solar-Hybrid Refrigeration System for Preservation of Vegetables”. Also motivating faculty to undertake socially relevant research and consultancy works.

He has also contributed to the governance and growth through different roles including Member of the Statutory Committees – **VTU Academic Senate Member** (2016-2019), **Member of Admissions Committee for Ph.D. in Faculty of Management Studies of VTU** (2017-2020), NAAC, UGC Expert Committee Member, VTU-LIC Committee Chairman, **BITES- Board of Governance Member**, VTU Nominee-Governing Council of City Engineering College, **Member-FICCI Higher Education Committee**, Institutional Statutory and functional committees of the college – Member Secretary, Governing Body and Chairman- Academic Council of RVCE.

Actively involved in networking with institution through technical talks, member in various committees of other institutions, serving as member in Professional societies including ISTE, ORSI, IIMM, QCFI, IIIE, ISSE, CII and CSI. Also invited by electronic & print media for giving talks and writing articles w.r.t. Higher Education.

He has won Awards including Performance Excellence Award from IIIE-Mumbai (2016), Dr. S.R. Gollapudi Award by IIIE-Mumbai (2013), Cognizant Award for Best Researcher, (2014) Citation Award from Vision Group on Science and Technology under K-FIST, Govt. of Karnataka (2014), Certificate of Appreciation by ISTE–RVCE Chapter (2005), ‘Excellence in Education’ & ‘Recognition of Excellence’ from R.V. College of Engineering (Multiple times).

Actively works for NELE Foundation – an NGO and contributing to the socially deserving children. His hobbies includes Reading, Cricket, Music and visiting places.

### **Day-3: 08/01/2020; Session-10 and Session-11**

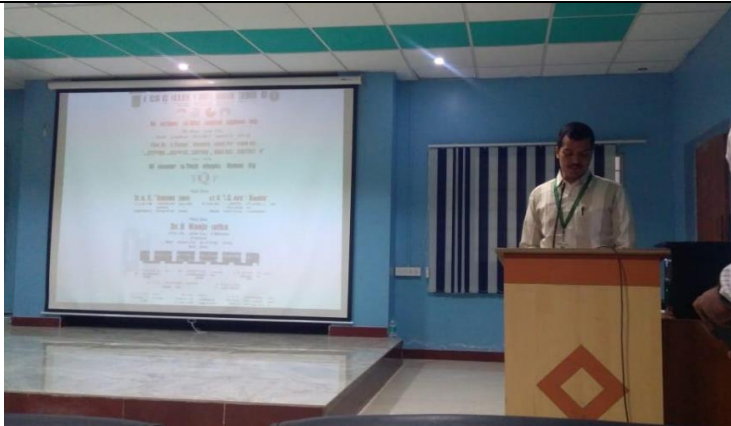
**Resource Person: Dr. Ravikumar L , professor , Department of Mechanical Engineering  
BMS College of Engineering , Bangalore**

**Topic: Innovative Practices in Academic**

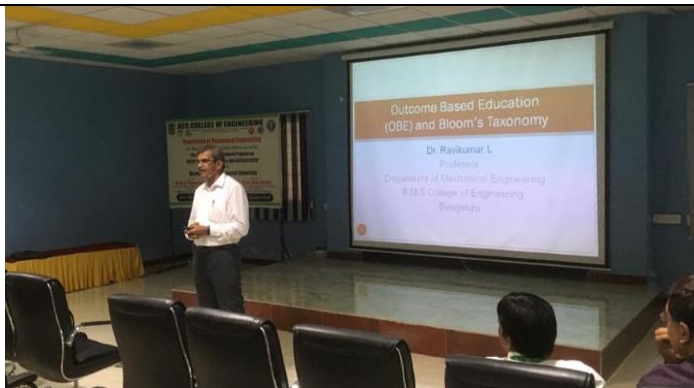


Ravi Kumar L. was born on the 5th May, 1968 at Koratagere, Tumkur District, Karnataka. Received Primary and Secondary education at Koratagere. After Passing Diploma in Mechanical Engineering at Government Polytechnic, Tumkur in 1986, joined Mechanical Engineering undergraduate course at Sri Siddaganga Institute of Technology Tumkur and obtained Bachelor's degree in 1990. Before Joining B.M.S. College of Engineering, Bangalore for the Master's Program in 1992, I have worked about 2 years at UCAM Ltd., Bangalore and HMTIV Tumkur as a Graduate trainee. After obtaining Master's degree in Machine Design, joined as faculty in the department of Mechanical Engineering, B.M.S. college of Engineering, Bangalore in September 1994. Obtained Ph.D degree in Aerospace Engineering from **IIT- Kharagpur** in 2004 with MHRD fellowship. Life member of the Aeronautical Society of India, Tribology society of India, Indian Society of systems for science & Engineering and ISTE. Area of Interest are Structural dynamics, Rotor dynamics, Stress analysis and vibration control. Publications in Journals: 21 Patents applied: 02 Conferences: 44 Funded Projects ((AR&DB & AICTE)Completed): 4 Funded Projects (ongoing): 02 Ph.D Students (Awarded): 03 Ph.D Students (ongoing): 02 MSc.(Engg.) by Research (Awarded): 02 M.Tech Students (Project work- Guided): 25 Responsibilities at the institute: Coordinator TEQIP-III, Institutional coordinator Research and Development Research projects executed: 06 Patents Applied:02

## Day-3 :Photo gallery



## Day-3 :Photo gallery:



## Day-4: 09/01/2020; Session-12 and Session-13

**Resources person: Mr. Vinay M Havalad**

Senior Product Specialist ,  
IonIdea Pvt Limited, Bengaluru

[vinay.havalad@ionidea.com](mailto:vinay.havalad@ionidea.com); [www.ionidea.com](http://www.ionidea.com)

**Topic: Measuring program outcomes and course outcomes**

Graduation: M.Tech Computer Science, VTU, Belgaum. He has 5 years of experience as Consulting OBE NBA through IonCUDOS platform. He is working with 80+ Institutions, helping them to institutionalize OBE in an efficient manner and has extensive experience in assisting UG, PG, Pharmacy, Polytech, MBA MCA programs in implementing OBE and SAR.



## Day-4: 09/01/2020; Session-14 and Session-15

**Resources person: Dr. Yogeesh**

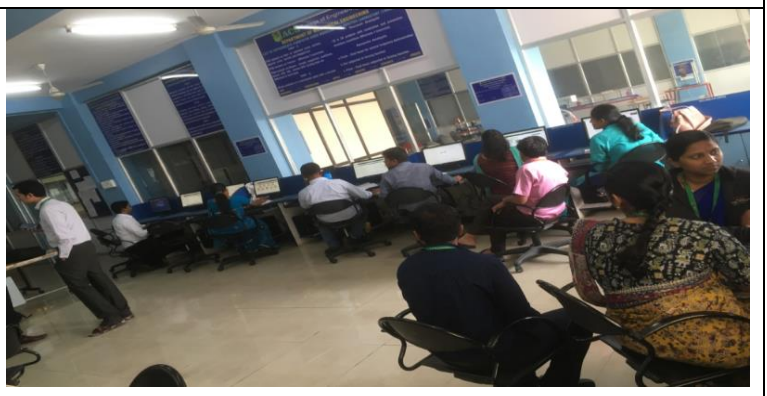
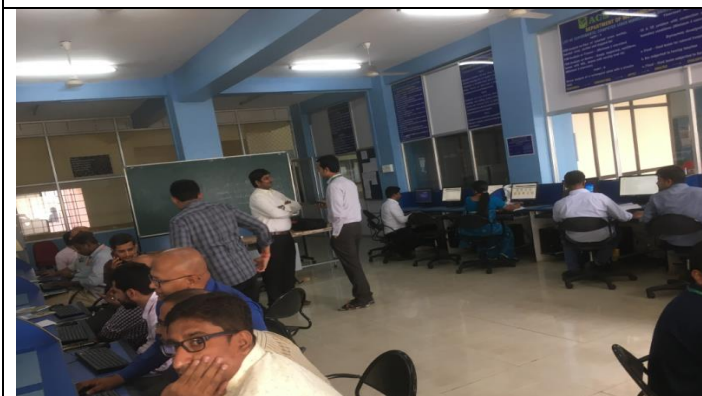
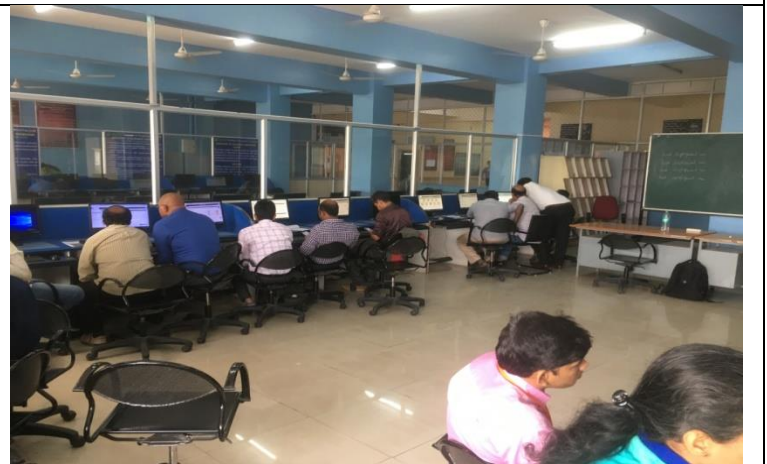
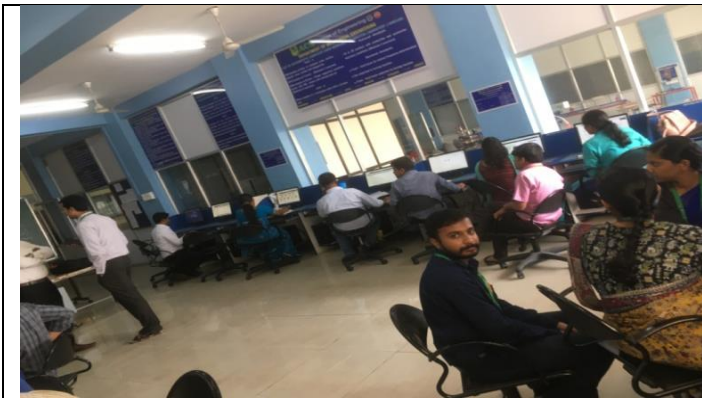
Senior Product Specialist ,

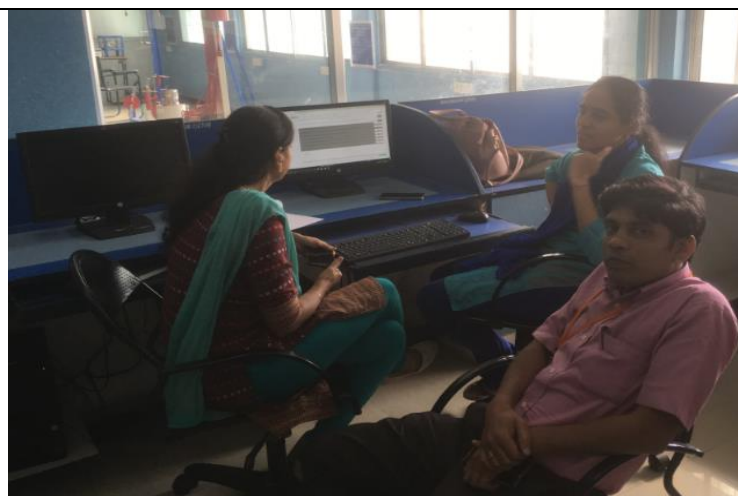
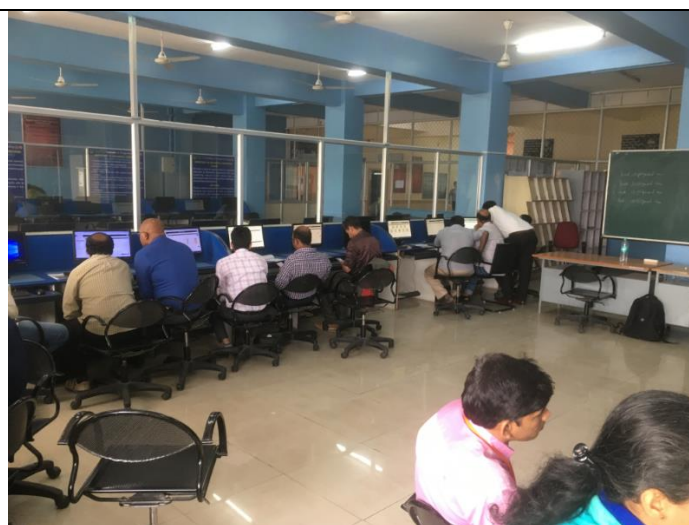
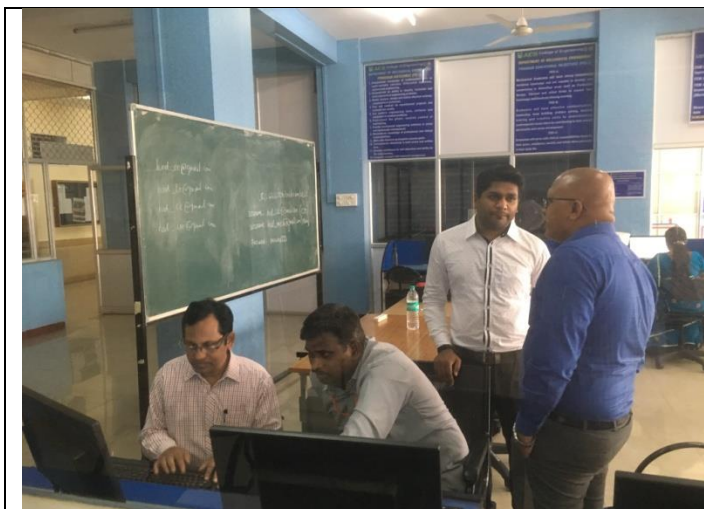
IonIdea Pvt Limited, Bengaluru

[vinay.havalad@ionidea.com](mailto:vinay.havalad@ionidea.com); [www.ionidea.com](http://www.ionidea.com)

**Topic: Measuring program outcomes and course outcomes**

**Hands on training at computer lab on “Measuring program outcomes and course outcomes”.**





**Hands on training at computer lab on “Measuring program outcomes and course outcomes”.**

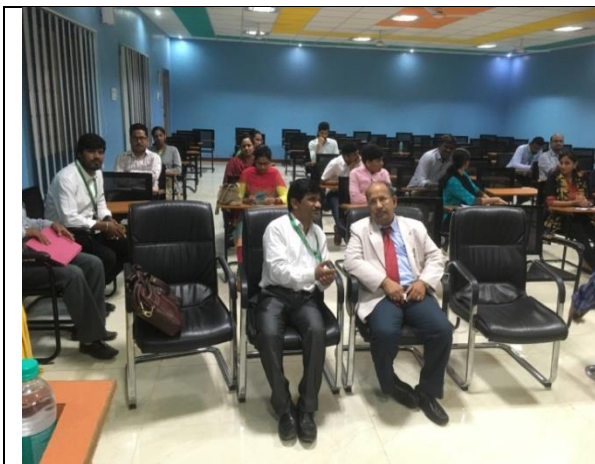
## **Day-5: 10/01/2020; Session-16**

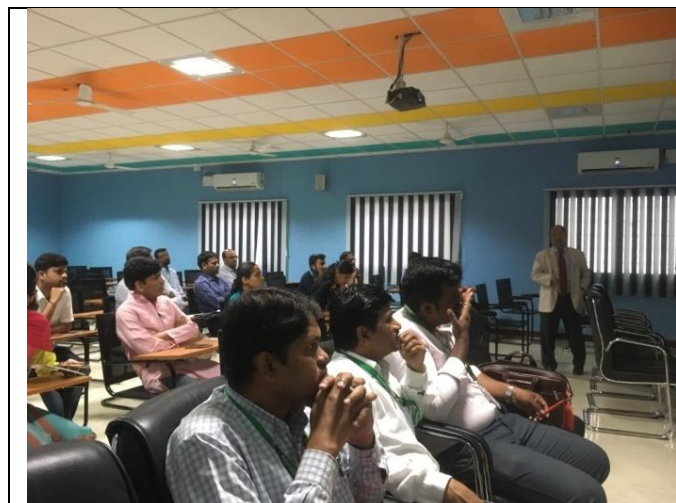
**Resource Person: Dr D H Rao , Former Dean, VTU, Belagavi**

**Topic: "Achieving Vision, Mission of the College/ Dept"**



Brief Profile : Dr.D.H. Rao obtained B.E. in Electronics from BMS College of Engineering, Bangalore in 1976 and M.E. from Madras University in 1979, M.S. and Ph.D. from University of Saskatoon, Canada in 1990 and 1994 respectively. He edited a book on Neuro-Control Systems published by IEEE in 1994. He obtained EMBA in 2007 and Ph.D. in HR from Virginia University, USA, in 2009 (external). Has published more than 150 papers and guided 13 Ph.Ds. He is a Senior member of IEEE & Fellow of IETE. He was a Member of Belgaum District Task force, Academic senate, VTU, Executive Council, VTU, Belgaum , Member of Recruitment Committee, Shivaji University, Goa Public Service Commission. Dr. Rao is a NLP trainer and has received many awards and certifications. He retired as the Dean of VTU, Belagaum, and External assessor for Glasgow Caledonian University, UK and Muscat. Presently He is the Director of Cambridge Group of Institutions, Bangalore.

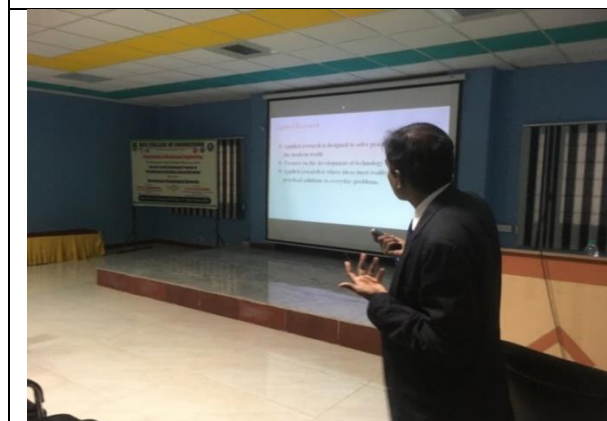




**Day-5: 10/01/2020; Session-17**

**Resource Person: Dr S .Vinoth, Director, Pongu ventures.**

**Topic: “Research opportunities for young research scholar”**



**Day-5: 10/01/2020; Session-18**

## **Queries and Discussion**



### **For the question from the percipient:**

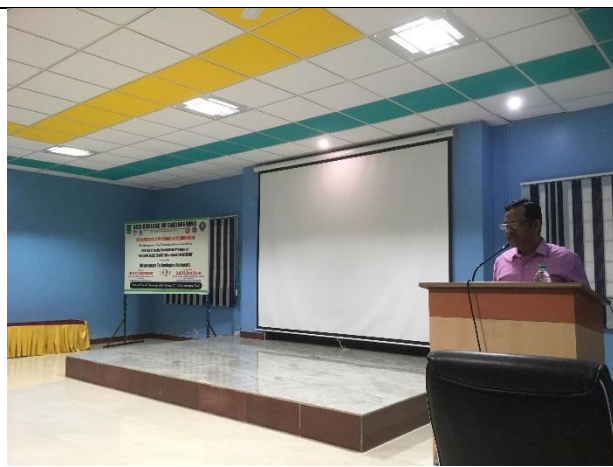
What sort of outcomes should be covered in a curriculum, how should they be assessed and how should outcome-based education be implemented.

**Dr. Madhu, HOD-ME, Government Engineering College , Ramnagar.** Answered for the queries regarding the Outcome Base Education and also shared his experiences in IIT campus as a Research Scholar.

## VALEDICTORY FUNCTION AND CERTIFICATE DISTRIBUTION

**PARTICIPANTS FROM VARIOUS COLLEGES SHARED THEIR EXPERIENCE AND LEARNING OF THE FIVE DAYS FACULTY DEVELOPMENT PROGRAM ON “OUTCOME BASED EDUCATION & NBA ACCREDITATION” SPONSORED BY VTU TEQIP1.3 on 6<sup>th</sup> TO 10<sup>th</sup> JANVARY 2020.**

### **Day-5 :Photo gallery**













## **OUTCOMES OF FIVE DAYS FACULTY DEVELOPMENT PROGRAM ON “OUTCOME BASED EDUCATION & NBA ACCREDITATION” SPONSORED BY VTU TEQIP1.3**

### **OUTCOME-BASED EDUCATION (OBE): Definition**

**Outcome-Based Education (OBE)** is a student-centric teaching and learning methodology in which the course delivery, assessment are planned to achieve stated objectives and outcomes. It focuses on measuring student performance i.e. outcomes at different levels.

1. **Course** is defined as a theory, practical or theory cum practical subject studied in a semester.

2. **Course Outcome (CO)** Course outcomes are statements that describe significant and essential learning that learners have achieved, and can reliably demonstrate at the end of a course. Generally three or more course outcomes may be specified for each course based on its weightage.

3. **Programme** is defined as the specialization or discipline of a Degree. It is the interconnected arrangement of courses, co-curricular and extracurricular activities to accomplish predetermined objectives leading to the awarding of a degree.

4. **Programme Outcomes (POs)** Program outcomes are narrower statements that describe what students are expected to be able to do by the time of graduation. POs are expected to be aligned closely with Graduate Attributes.

5. **Program Educational Objectives (PEOs)** The Programme Educational Objectives of a program are the statements that describe the expected achievements of graduates in their career, and also in particular, what the graduates are expected to perform and achieve during the first few years after graduation.

6. **Programme Specific Outcomes (PSO)** Programme Specific Outcomes are what the students should be able to do at the time of graduation with reference to a specific discipline. Usually there are two to four PSOs for a programme.

7. **Graduate Attributes (GA):** The graduate attributes, 12 in numbers are exemplars of the attributes expected of a graduate from an accredited programme.

**Knowledge levels** for assessment of Outcomes based on **Blooms Taxonomy**

| <b>Level</b> | <b>Parameter</b> | <b>Description</b>                                                                                                                           |
|--------------|------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| K1           | Knowledge        | It is the ability to remember the previously learned material/information                                                                    |
| K2           | Comprehension    | It is the ability to grasp the meaning of material.                                                                                          |
| K3           | Application      | It is the ability to use learned material in new and concrete situations                                                                     |
| K4           | Analysis         | It is the ability to break down material/concept into its component parts/subsections so that its organizational structure may be understood |
| K5           | Synthesis        | It is the ability to put parts/subsections together to form a new whole material/idea/concept/information                                    |
| K6           | Evaluation       | It is the ability to judge the value of material/concept/statement/creative material /research report) for a given purpose                   |

## **The 12 Graduate Attributes in Outcome Based Education**

**1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization for the solution of complex engineering problems.

**2. Problem analysis:** Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

**3. Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.

**4. Conduct investigations of complex problems:** The problems:

- That cannot be solved by straightforward application of knowledge, theories and techniques applicable to the engineering discipline.
- That may not have a unique solution. For example, a design problem can be solved in many ways and lead to multiple possible solutions.
- That requires consideration of appropriate constraints/requirements not explicitly given in the problem statement. (like: cost, power requirement, durability, product life, etc.)
- Which need to be defined (modeled) within appropriate mathematical framework.
- That often requires use of modern computational concepts and tools.

**5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling to complex engineering activities, with an understanding of the limitations

**6. The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice

**7. Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. Communication: Communicate effectively on complex engineering activities with the engineering community and with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

### **Outcome-Based Education**

- OBE is an educational process.
- Directed/focussed at achieving certain specified outcomes in terms of individual student learning.
- Outcomes - key things students should understand and be able to do or the qualities they should develop.
- Both structures and curricula are designed to achieve those capabilities or qualities.
- Educational structures and curriculum are regarded as means not ends. If they do not do the job they are rethought (Continuous Quality Improvement (CQI)).

### **Benefits of OBE:**

- More directed & coherent curriculum.
- Graduates will be more “relevant” to industry & other stakeholders (more well rounded graduates).
- Continuous Quality Improvement (CQI) is in place.

### **Roles of Faculties**

- Review PEOs, POs, course structures and syllabi.
- Teach the relevant engineering, maths, and other relevant subjects.
- Conduct relevant tutorials and laboratory practical sessions.
- Give appropriate guide on assignments and projects.

- Conduct empirical measurements of POs.
- Prepare the required documentation.
- Assure EAC (Engineering Accreditation Council) and public on the standard of our graduates.
- Obtain and maintain accreditation from EAC through Continuous Quality Improvement (CQI).

### **Roles of Students**

- Know the required Programme Outcomes and Programme Objectives .
- For each course, review the Learning Outcomes gives you an idea of the knowledge and skills expected from a particular course.
- Be more proactive in the learning process to acquire the Learning Outcomes of subjects.
- Give constructive feedbacks -- Online Teaching Evaluation, Academic Advisory System, dialog sessions with Dean, etc.