OCTOBER 2019

MECHNOVATION

Igniting Young Minds

DEPARTMENT OF MECHANICAL ENGINEERING

MEERUT INSTITUTE OF ENGINEERING TECHNOLOGY

MEERUT INSTITUTE OF ENGINEERING AND TECHNOLOGY

MECHOVATION

"Igniting Young minds"

October, 2019

Department Of Mechanical Engineering

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Mechanical Engineering Department

Vision of the Department

To become a nationwide recognised department for research oriented quality technical education in line with emerging trends and evolving demands of society.

Mission of the Department

The mission of mechanical engineering department includes:

1. To Embrace excellent teaching learning techniques to provide practical quality education that is commensurate with the emerging trends and industry demands.
2. To promote research in interdisciplinary areas by forging collaborations with global industries and establishing state-of-the-art research facilities in order to develop among students innovative and creative capabilities.
3. To mentor and guide young technocrats and inculcate them with the spirit of entrepreneurship alongwith ethics, values and eco-sensitivity.

Program Educational Objectives (PEOs)

After five years from completion of graduation, the student will:

1. Pursue career as practicing mechanical engineer in core mechanical or allied industries worldwide.
2. Meet the expectations of modern industries for catering the proliferating demand and rising quality standards.
3. Become a responsible engineer capable of conducting sustainable, environment-friendly, innovative research and development in advanced domains.
4. Serve the society better by practicing professional leadership roles with a commitment to lifelong learning.
5. Become a person with a strong will and attitude to excel through the challenges in all walks of life.

Program Outcomes (POs)

Engineering Graduates will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review 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 the public health and safety, and the cultural, societal, and environmental considerations.

4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling 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 teamwork:** 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 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. **Lifelong 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.

Program Specific Outcomes (PSOs)

Engineering Graduates will be able to:

1. **PSO 1:** Implementing the concepts of mechanical engineering for generating innovative ideas of design, development and analysis..
2. **PSO 2 :** Develop solution for engineering problem through multi- disciplinary concepts if Industrial automation and Industry 4.0.
3. **PSO 3:** Work independently as a professional or entrepreneur in research and industrial environment.

MBA/ M.Tech after B.Tech - Pros and Cons

One of the most common questions among final-year B.Tech/ B.E students is which course to choose after B.Tech. Students are often confused while choosing the apt course after B.Tech. There is equal preference for MBA and M.Tech after B.Tech. Both MBA and M.Tech courses have their own pros and cons. The career score and employment scenario for MBA and M.Tech is not the same. Choosing the right path depends on the mindset of students. For example, some students prefer to take up a job after B.Tech instead of pursuing higher studies. Students design their career by considering several aspects, and the requirements of each student are different from the other.

Dr. Pardeep Kumar
Assistant Professor
Mechanical Engineering

Choosing between M.Tech and MBA may be quite confusing for students. In order to mitigate the confusion, it is advisable to understand what opportunities both MBA orM.Tech course offer. Both courses will tune your career, and one must choose the right path as per his/ her capabilities, aim, and requirements.

MBA vs M.Tech – Trend in India

For most engineering students, life revolves around numbers and comparative deductions. Therefore, let us go through some statistics about Indian engineering graduates' preference for MBA and M.Tech.

Recently, the Times of India conducted a survey in India wherein it went through the CVs of Indian CEOs to figure out and understand the educational paths taken by them. The survey revealed that 45% of CEOs in India completed their graduation in engineering. Among the CEOs who did their graduation in engineering, 78% pursued post-graduation, out of which 64% of CEOs opted for an MBA degree. These CEOs have completed MBA from top B-Schools across the globe such as Stanford, Harvard, IIM, XLRI etc.

The survey also revealed that 83% of CEOs who own a family-run company pursued MBA from top B-Schools, and most of these CEOs completed their UG in engineering.

After referring to the above statistics, you may think why a large chunk of people opted for MBA after B.Tech. Therefore, students need to understand the career path that MBA offers after B.Tech.

As far as M.Tech is concerned, students choose M.Tech after B.Tech to pursue a career in teaching and research. M.Tech offers good scope for research, and students get a chance to contribute to society. At the same time, M.Tech graduates can fit in professor roles in universities and colleges across the country after attaining necessary higher qualifications. Nevertheless, the major question is which career gives a long-term secured career – MBA or M.Tech.

Renowned industrialists and professors at top engineering institutes were of the opinion that choosing MBA after B.Tech is a mere deviation from the engineering path. Even though MBA is the most popular, the country needs more M.Tech graduates. Technical industries across the globe prefer M.Tech graduates, and one can expect a lucrative career with M.Tech.

Pros and Cons of Pursuing M.Tech after B.Tech

M.Tech is the best career path for final-year B.Tech students who are aiming to enhance their knowledge in the subject. M.Tech is a specialisation course through which B.Tech graduates can hone their technical skills. The market needs experts in the subject, and there is grand respect for the subject experts in India. M.Tech gives in-depth technical knowledge that MBA does not offer.

Even though managerial positions in various companies are alluring, there is equal importance for the chief technical officer who plays a vital role in taking technical decisions of a company. The post has less competition, and an M.Tech student with good technical knowledge has more demand in the job market.

Another major advantage of pursuing M.Tech is greater scope for pursuing a doctoral degree (Ph.D). A Ph.D. degree in engineering will land you in top-notch positions in universities and colleges across the globe. Ph.D. graduates in engineering have good scope to hold research positions in various organisations, and the pay scale offered to such positions is lucrative. At the same time, Ph.D. holders have great respect in the society.

A Ph.D. degree after M.Tech helps you to take up professor jobs in universities across the globe. The annual salary offered to professors in India ranges from Rs. 12 lakh – 15 lakh per annum. Despite a high pay scale, the job of a professor is free from pressure and stress. There are no targets, and one can lead a peaceful life.

Top engineering colleges in India such as IITs, NITs offer a stipend to M.Tech graduates under certain eligibility conditions. There is no stipend facility for MBA course in India.

As far as cons concerned, the limiting career scope for the M.Tech is the major reason for the higher MBA preference after B.Tech. Today, the job market needs wider knowledge over technical expertise. In order to excel in a competitive world and corporate field, one must understand varied aspects of business management such as marketing, finance, human resource management etc. An M.tech course does not offer knowledge in these aspects, which is a barrier for career advancement in the corporate world.

Even for most government jobs in the engineering sector, B.Tech is considered as the qualification for different roles. If the B.Tech graduates have a strong GATE score, the chances of securing employment in PSUs through GATE is high. Students with an aim to secure a job in the government sector or PSUs do not prefer M.Tech. However, some PSUs that offer jobs without GATE score.

Another major disadvantage of M.Tech course is a tough curriculum. Students require a lot of hard work throughout the academics to secure a good percentile. Only a limited number of good colleges in India offer M.Tech course and securing admission in such colleges is very difficult. For example, IITs offer M.Tech admission through GATE, and securing admission needs the best score in GATE. On the other hand, IITs offer a limited number of seats, and there is huge competition for admission.

Pros and Cons of Pursuing MBA after B.Tech

MBA course trains the graduates to handle a broad spectrum of situations pertaining to business. Taking up MBA after B.Tech might be a positive move, as it provides a technical graduate with management knowledge. Jobs in the corporate world need both technical and management knowledge and MBA after B.Tech is the perfect combination for a successful career. MBA opens career opportunities in multiple sectors and the employment scope is high.

MBA inculcates teamwork strategies and leadership skills leading to career advancement. In other words, MBA not only enables higher employability rate but also gives more scope for career advancement. MBA graduates in India are paid lucrative salaries right from the beginning of their career.

If you have a family business, MBA is the right choice to enhance the scope of your family business. You can implement new strategies through your knowledge. Similarly, MBA is the right option for those planning to set up their own business. The course helps the students to

understand the market conditions and strategies followed by competitors to attract the customers.

As far as the disadvantages concerned, the competition for MBA in India has increased in recent years, and the scope of employment has been decreasing. Only a limited percentage of MBA graduates are able to secure jobs in top firms with best salary packages. Top firms in India prefer only MBA graduates from premier or top B-Schools across the country.

On the other hand, MBA fees are higher than the M.Tech course in India. For instance, if a student secures MBA admission in top B-School, he/ she have to pay at least Rs. 4 lakh – Rs. 6 lakh per annum. Scholarships, stipend and loan facility is limited, and not all students may avail those benefits.

If an MBA graduate fails to secure a job with a good salary package, it will take years to cover the expenses incurred for studying MBA.

The quality of MBA education in India has become a major concern due to the prevalence of a higher number of colleges. There are numerous private MBA colleges in India where students are being exposed to theoretical learning than practical exposure. Every year, lakhs of students graduate MBA, and only a few of them are able to find jobs with a satisfactory salary package.

Securing admission in top B-Schools like IIMs is not easy, as the selection process involves different stages. Students must score the best percentile in CAT to secure admission in top IIMs.

Conversation of environment and energy cost reduces by Natural refrigerants

Mr. Mudit Sharma
Assistant Professor
Mechanical Engineering

Recently, a team of Iranian researchers investigated how natural refrigerants could replace CFCs, HCFCs and HFCs in geothermal heat pumps to reduce energy consumption and operating costs. They report their findings in the *Journal of Renewable and Sustainable Energy*, from AIP Publishing.

The researchers also examined the environmental and economic benefits of zeotropic and azeotropic refrigerants, as well as natural refrigerants. Based on their modeling, the researchers determined that natural materials, including ammonia and n-butane, are the most economical and environmentally friendly replacement refrigerants for geothermal heat pumps.

Geothermal heat pumps exploit how the earth's temperature below the surface stabilizes in mid-50s-degree Fahrenheit by using a vapor compression cycle equipped with buried pipes in horizontal trenches or vertical boreholes. Geothermal heat pumps extract heat from the ground (in the winter) and dissipate heat to the ground (in the summer) by circulating fluid such as water through buried pipes. This design takes advantage of the moderate temperatures in the ground to boost efficiency and reduce the operational costs of heating and cooling systems.

In their review, the researchers ran an Hour Analysis Program to calculate the heating and cooling loads in a 14-story, residential building. Then, they applied their findings to an Engineering Equation Solver to model the thermodynamic cycle of an open and closed loop ground source heat pump with different known refrigerants.

"The big challenge for the coming years in the HVAC and refrigeration industry is to establish natural refrigerant technology to substitute CFCs, HCFCs and HFCs refrigerants," said Mostafa Mafi, one of the authors on the paper. "A solution to reduce energy consumption in heat pumps is using the earth as a renewable heat source/sink to both increase efficiency and create a diversity of energy sources."

Carbon –dioxide as Natural Refrigerants

Dr. Kamal Singh Rawat
Assistant Professor
Mechanical Engineering

The Montreal and Kyoto protocol are two frameworks towards a single goal of environment safety. These protocols suggest prohibiting the usage of synthetic refrigerants to prevent ozone layer depletion and control global warming as well. Such conditions encourage us to consider CO_2 as a working fluid for refrigeration and air conditioning systems.

With the growth of world's economy use of refrigeration systems are increasing, which increases emission potential of refrigerants to the environment with its negative effect. It was discovered that some refrigerants causes ozone layer depletion and global warming, which is a serious hazard to environment. In order to control the depletion of ozone layer, in 1987 Montreal protocol phasing out some synthetic refrigerant but it did not cover the global warming potential of the refrigerants. Refrigerants which lead to global warming are advised to prohibit by Kyoto Protocol released in 2011. Therefore, for the sake of environmental safety, we again concern the natural refrigerants such as carbon dioxide, ammonia, hydrocarbons etc. due to their zero ozone depletion potential (ODP) and low global warming potential (GWP). Among natural refrigerants CO_2 could be an important alternative to synthetic refrigerant due to its some useful characteristics such as non-toxic, odourless, non-flammable, low price and easy availability. Even carbon-dioxide is a greenhouse gas but as it is captured from environment therefore any leakage of CO_2 does not increase the overall volume of CO_2 present in environment thus does not contribute to global warming.

Carbon dioxide has NBP is -87.84 ^oC and critical temperature 30.98 ^oC. Due to very low NBP it can be used in very low temperature refrigeration applications (deep freezing and lower circuit refrigerant of a cascade refrigeration system) and due to low critical temperature CO_2 works in Transcritical cycle (modified vapour compression cycle) for simultaneous heating and cooling purpose.

ERPsim: Dynamic, Engaging, Real Learning

Mr. Rahul Sharma
Assistant Professor
Mechanical Engineering

ERPsim is a business simulation game for SAP ERP and SAP S/4HANA in which participants use a real ERP system to manage their virtual company in a competitive market. Win or lose, participants will improve their knowledge of business processes and their understanding of how ERP systems are effective at managing those processes.

Immersive Experience

Learners get to use a real SAP S/4HANA system to evaluate, input and see the result of their decisions. Our approach makes use of actual transactions provided by SAP as well as custom transactions, which provides a mix that is very close to what an ERP user would experience in the workplace.

ERPsim help enabling learning by generating a dynamic environment where it accelerates time, simulates interactions with business partners, and automates administrative tasks execution. This approach allows learners to focus on analytics and decision-making and gives them an incentive to get better at translating their strategy into action using an ERP system.

Learning by Doing

By accelerating time (a business day is one minute!), learners have to focus on making the best decisions in the most efficient way possible. As the simulation evolves, they will be looking for ways to elevate their knowledge of the ERP system and might come up with solutions to improve their decision making (for example, by creating tools to support their decision model).

ERPsim creates the perfect setting to introduce concepts and challenges of business processes and information management, change management, information security and auditing, and more. For example, each simulation scenario can be played using previous-gen as well as next-gen user interfaces and tools, allowing learners to experience the evolution of a business system in a short period of time.

Analytics in Real-Time

Being able to create visualizations and validate their effectiveness on data that they own and on which they can have an impact is a powerful way for learners to improve their analytical skills.

ERPsim supports analytics in real-time, from SAP Fiori analytical applications (SAP Smart Business) to OData services, as well as many of the self-service BI tools available on the market, including SAP Lumira, Tableau and Power BI

Source: https://erpsim.hec.ca/en

Message from the editorial board

"Knowledge, like air, is vital to life. Like air, No one should be denied it"

Team Mechnovation "Igniting Young Minds" are proud to present this edition, with a aim to provide our reader's door step access to the knowledge pool our accomplished faculties, the dedicated student, and other reputed scholars have formed. We are proud to present to you our Powerful Department of Mechanical engineering. These articles are the result of a lot of Dedication and Effort put in by many Leamed Scholars and it gives us immense pleasure in knowing that our magazine can become the medium between you and this ग्रंथ of Knowledge. We look forward to keep bringing more content and taking your knowledge to new horizons.

Manik Gupta (Writer) | Aditya Jain (Editor) | Aryan Tomar (Designer) | Aditya Pratap (Photographer)

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Thank You