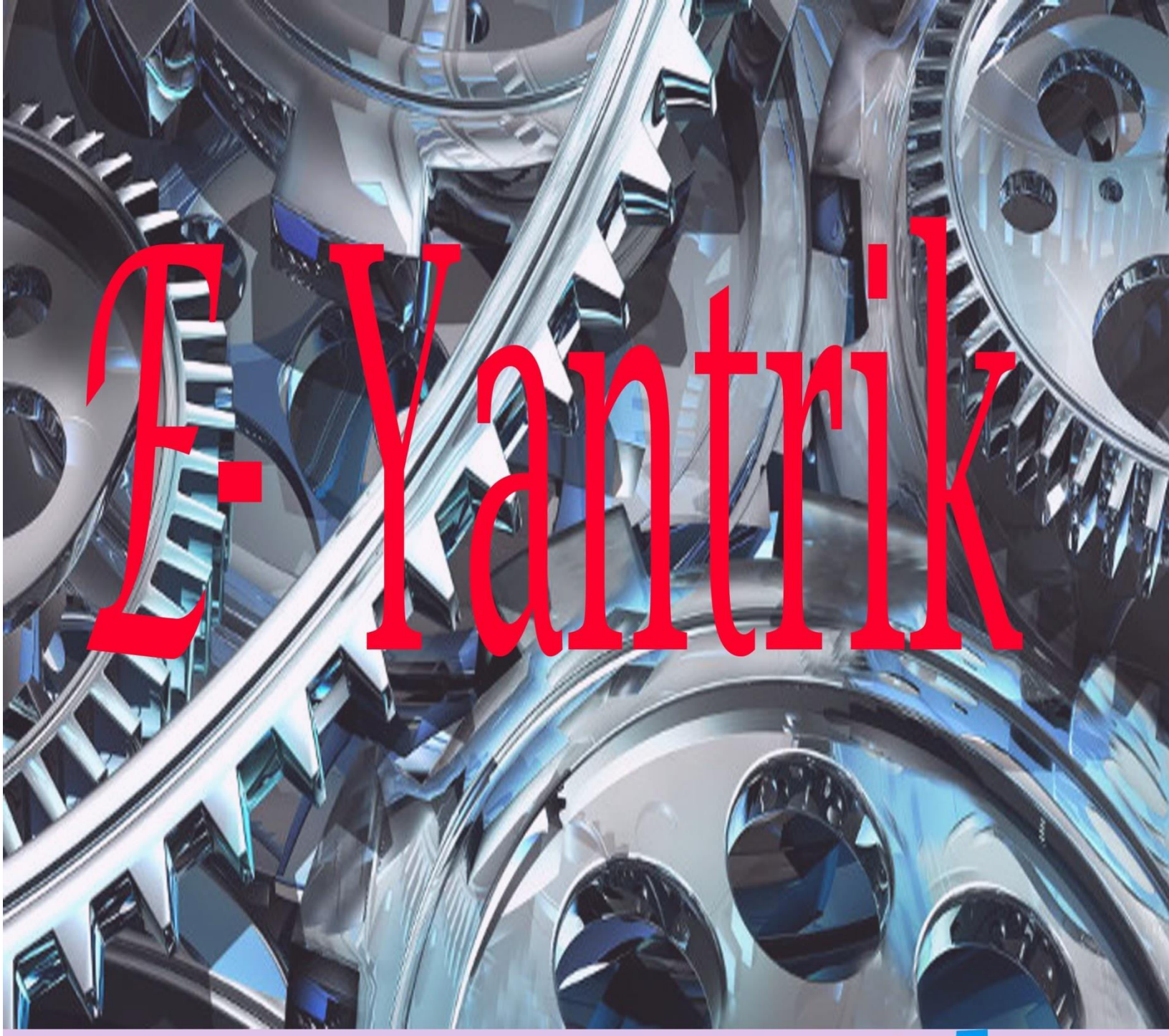


E-Yantrik

Volume: 4

1st :Issue

GIFT

Student Editors: *Janardhan Jha*

Mayanka Aagarwal

Faculty Editor: *Ayusman Nayak*

Vision of the Department:

To become a centre of excellence, acclaimed globally as a source of knowledge in the field of Mechanical Engineering by producing the professionals of highest grade to excel in the field of Industry and Research, bearing the ability to face the challenges posed by latest technology and competition.

Mission of the Department:

- To impart quality education to the students and enhance their knowledge and skills to make them globally competitive Mechanical Engineers.
- To become a leader in the field of Mechanical Engineering by acquiring and disseminating knowledge, using the best methods of teaching.
- To develop linkages with Industrial and Research organizations, enterprises in India for industry-oriented projects to apply theoretical knowledge to practical problems.
- To develop entrepreneurship skill of the students to make them ready for self-employment.

PEO's of the Department

Program educational objectives of Undergraduate Mechanical Engineering Department are:

- PEO-1 : Our graduates will succeed as a mechanical engineer or obtain an advance degree by applying basic principles of engineering and skills to solve complex engineering problems.
- PEO-2 : Our students will be able to carry out Multidisciplinary research using modern tools and adapt to current changes by inculcating habit of lifelong learning.
- PEO-3 : Our Students will be able to work in the field of clean energy for the welfare of the society as responsible citizens with good ethics.

From the HOD'S Pen

Dear Readers,

GreetingsfromDepartmentofMechanicalEngineering!

I am pleased to know that our students are successful in bringing their first issue of magazine E-YANTRIK for this academic year 2017-18. E-YANRIK, the departmental magazine has the prime objective of providing aspiring engineers a wide platform to showcase their technical knowledge and to pen down innovative ideas. This magazine is intended to bring out the hidden literary talents in the students and teachers to inculcate strong technical skills among them. As a half yearly magazine of GIFT, it helps the students to interact and share their ideas with the industry leaders and their peers studying in the college.I congratulate and thank all the students and faculty coordinator who have made untiring efforts to bring out this magazine.

I thank everyone for their valuable contributions to the magazine and hope to receive similar enthusiasm through your precious insight in the fourth coming issues of E-YANTRIK.

Thanks & Regards,

Dr. Nabnit Panigrahi

H. O. D, Mechanical

Gandhi Institute For

Technology, Bhubaneswar

From the Editor's Pen

Dear Readers,

Greetings from Department of Mechanical & Engineering!

It brings me immense pleasure to bring the second issue of the E-YANTRIK to you. E-YANTRIK has only just begun to explore the potential of the new digital media. I look forward to some awesome output from our students in the coming years. And I wait with bated breath for Best of this year' s to have a laugh, turn a thought, and to try and form a mental picture of what we really are like.

Campus magazine is important not just for capturing the currents and moods of the time, but also because they are an archive we can visit later to view ourselves from the distance t hat the years will bring. I am glad E-YANTRIK is putting together literary pieces and reviews of the major contributions of GIFT.

E-YANTRIK is by the students, of the students and for the students to bring out their creative skills.

I can just thank and congratulate everyone involved in making this effort a grand success by contributing their articles to spread knowledge and to all of those who have put their heart in to this.

Thanks & Regards,

Prof. Ayusman Nayak,

Asst. Prof., Dept. of Mechanical

Editor, E-Yantrik

Articles

SUSTAINABLE EXTRACTION OF BIO-ETHANOL FROM BAMBOO AND ITS POTENTIAL IN INDIA

Prof. Mr. Amar Kumar Das

The necessity for development of sustainable liquid bio fuels in the transport sector is acknowledged globally due to concerns regarding energy security, oil price volatility and environmental pollution. The global energy sectors are facing the crucial change of sustainability and diversification of energy resources. Seeking renewable resources with sustainable supply to meet the energy challenges are the matter of utmost concern. Indigenous climatic condition favors the growth of bamboos in abundant rate in comparison with others feedstock and it require low artificial managements to grow along with it takes low cost for bamboo forestation An economic and sustainable technique of production of alcohol from bamboo using Liquid hot water (LHW) pre-treatment. It may be addressed as a promising method to enhance sugar release from bamboo lignocelluloses and attributes to environmental security. Bamboo is a highly abundant source of biomass which is underutilized despite having a chemical composition and fibers structure similar as wood. The present study emphasis on the major factors affecting alcohol fermentation and attributes towards feasibility test for bio fuel use at the commercial scale. Bio ethanol from bamboo becomes appropriate for both technically and economically feasible, as well as competitive with fossil fuels. However more research is needed to enhance the quality of alcohol produced from bamboo with selective measures like improving sugar release with more effective pre-treatment and reduced enzyme usage, accessing low cost bamboo feedstock or selecting feed stocks with higher or more accessible cellulose. The present work proposes an integrated bio refinery process thereby allowing the improvement and expansion of bamboo utilization in industrial processes. Future work will include detailed financial analysis of the process investigating in this work.

The recalcitrance of lingo cellulose is one of the major barriers to the economical production of bio ethanol. Pretreatment remove the complexity of the substrate, breaks the bond between lignin, cellulose and hemi cellulose and accessible them to hydrolytic enzymes for conversion to glucose. If the pretreatment is not done properly enough the resultant residue is not easily break by cellulose enzyme and also if more severe, it causes production of toxic compounds such as furfural, hydroxyl furfural etc. which can create problem for the normal growth of fermenting microbes.

HYDROLYSIS

Mr. Mukesh sahoo ,4th year ,Mechanical

Hydrolysis is a process in which the carbohydrate polymers in lingo cellulosic materials are converted to simple sugars before fermentation. There are various methods for the hydrolysis of lingo cellulosic materials have recently been described. The most commonly applied methods can be classified in two groups: chemical hydrolysis (dilute and concentrated acid hydrolysis) and enzymatic hydrolysis. By the hydrolysis of lignocellulosic material so many products can form .Hemicelluloses are hydrolyzed to xylose, mannose, acetic acid, galactose, and glucose are liberated. Whereas cellulose and lignin are hydrolyzed to glucose and phenolics respectively. Mainly propionic acids, acetic acid, hydroxy-1-propanone, hydroxy-1-butanone and 2-furfuraldeyde are formed due to degradation of xylan.

CHEMICAL HYDOLYSIS:-

In chemical hydrolysis lignocellulosic materials are exposed to a chemical for a period of time at a specific temperature, chemical concentration, substrate concentration and results in sugar monomers from cellulose and hemi cellulose polymers. In the chemical Hydrolysis, the pretreatment and the hydrolysis may be carried out in a single step. Acids are predominantly used for chemical hydrolysis. There are two basic types of acid hydrolysis processes: dilute acid and concentrated acid. Dilute acid hydrolysis is used from past so many years for converting cellulose to glucose. High temperature and pressure are required for this process and also has a reaction time in the range of seconds or minutes. Dilute acid process involves a solution of about 1% H_2SO_4 concentration in a continuous flow reactor at a high temperature (about 488 K). Most dilute acid processes are limited to a sugar recovery efficiency of around 50%

ENZYMATIC HYDROLYSIS:-

Acid hydrolysis has a major disadvantage where the sugars are converted to degradation products like furfural, hydroxyl furfural. This degradation can be prevented by using enzymes favoring 100% selective conversion of cellulose to glucose. Enzymatic hydrolysis involves enzymes for the degradation of cellulose and hemicellulose. Structural parameters of the substrate, such as lignin and hemi cellulose content, surface area, and cellulose crystallinity hindered the enzymatic hydrolysis of cellulose and hemi cellulose. Enzyme hydrolysis is usually

conducted at mild conditions (pH 4.8) and temperature (318–323 K) and does not have a corrosion problem, this leads to its low utility cost as compared to acid or alkaline hydrolysis.

India is a fast growing economy with an inherent increase in demand for energy. While keeping a huge population and limited energy resources in mind, the nation is looking for alternative renewable fuels to support the pace of growth. India is one among the largest producers of ethanol and currently all commercial ethanol production in the country uses molasses as feedstock. Therefore, production of ethanol from other renewable resources such as agriculture residues, fruit waste edible oil cake etc is imperative for meeting this increased demand. These materials could prove as a cheap and abundant feedstock, and have potential to produce fuel bio ethanol at reasonable costs.

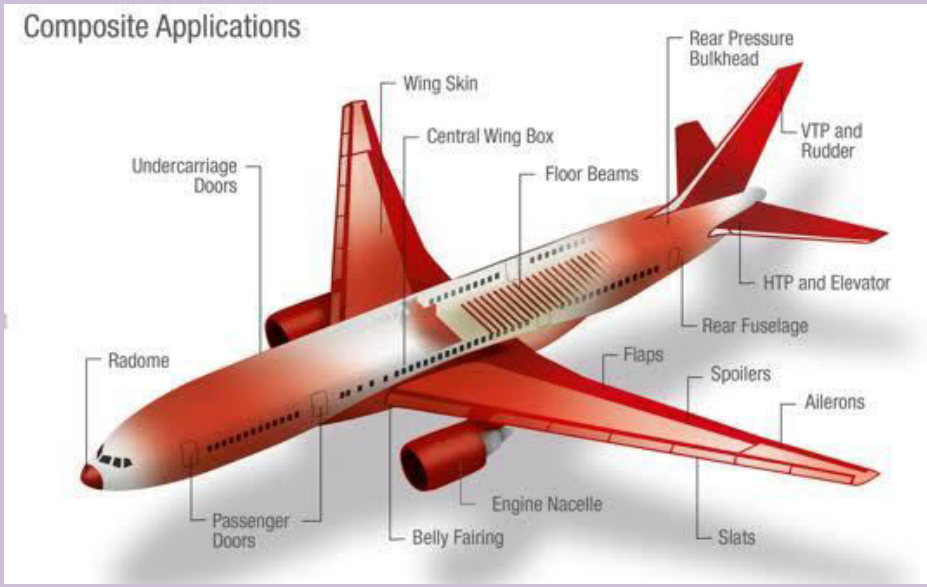
ADVANCED COMPOSITE MATERIALS FOR AEROSPACE INDUSTRY: A FUTURE PERSPECTIVE

Ritesh Mohanty, 3rd year Mechanical

The advancement in material properties has helped us to grow quickly and inexpensively in the world, by improving the performance and operations of modern aircraft. In the first part of this study the composites materials with their pro and cons is described. Airbus and its innovation in composite materials are introduced in the second part of the thesis. Composite technology continues to advance, and the advent of new types such as nano tube forms is certain to accelerate and extend composite usage. Anyway, a continuing movement in material development is the improvement in processing and production of incumbent materials to either improve physical properties or to allow their application in new areas and roles for further usage in the future.

There is a revolution underway in commercial aircraft manufacturing today and it can be summed up in one word: composites. There are many good reasons for aircraft manufacturers to use composites and for airlines to want composites to be used in their fleets. Many composite

materials achieve relatively greater strength characteristics compared with traditional metallic materials, reducing aircraft weight and thus reducing fuel cost per passenger carried. Composites are more resistant than metal to fatigue from repeated take off/landing cycles, resulting in fewer costly inspections over the aircraft's lifespan and more time spent in the air making money.



Composite materials are becoming more important in the construction of aerospace structures. New generation large aircraft are designed with all composite fuselage and wing structures and the repair of these advanced composite materials requires an in-depth knowledge of composite structures, materials and tooling. The carbon nanotube technology itself is the greatest challenge for being able to drive scale to volume and decrease cost. For example, it is great to have a cable that's 69% lighter weight, but we have to be able to produce this in a format and in a cost that can be broadly used by aircraft engineers. So, the future is driving up the output, decreasing cost and eventually getting broadly used across the entire industry. Moreover, standards are being set-up for the testing and computerization of mechanical and corrosion property. Since the development of new fire retarding elements, the availability of polymers with higher temperature ratings, the relative ease of fabrication, and fair cost. MMC and CMC parts, tends to indicate that important progress has been made towards reduction of processing and manufacturing costs. So it is important to realize that the use of composites requires an integrated approach between user and designer/manufacturer to ensure functionality.

SUSTAINABLE DEVELOPMENT OF SMART CITIES

Mr. Swapnasarit Kar ,2nd year ,Mechanical

The concept of smart city is relatively new and can be seen as a successor of information city, digital city and sustainable city . However it has been used frequently, especially after 2013, when it exceeded a frequency of citations of other terms including sustainable city . However it has been used frequently, especially after 2013, when it exceeded a frequency of citations of other terms including sustainable city . Despite the discussion about its concept in recent years, there is a lack of consensus on what a smart city . Although a number of authors have the difficulty of conceptualisation, these definitions are not contradictory but partially overlapping. Environmental externalities mainly generated from population increase, rapid urbanization, high private motor vehicle dependency, deregulated industrialization, and mass livestock production have placed serious concerns for the future of our wellbeing, and even our existence in the long run. Realization of the fact that urgent measures must be taken to combat environmental externalities responsibly, effectively, and efficiently have resulted in the rediscovery of the need for more eco-friendly practices.

Development the smart citizen:-

- Improve quality of life of its citizens.
- Ensure economic growth with better employment opportunities.
- Improve well-being of its citizens by ensuring access to social and community services.
- Establish an environmentally responsible and sustainable approach to development.
- Ensure efficient service delivery of basic services and infrastructure such as public transportation, water supply and drainage, telecommunication and other utilities.
- Ability to address climate change and environmental issues, and.
- Provide an effective regulatory and local governance mechanism ensuring equitable policies.

ROBOTICS

Mr. Amit Kumar , 2nd year, Mechanical

Robots are machines that can operate autonomously based on programs and commands embedded on its software. Robotics is therefore a convergence of computer science, mechanical engineering and electrical engineering. Robots are designed to replace humans in fields which are viable for automated pre-programmed operations. However, in recent times, 'Artificial Intelligence' has opened new vistas in the field of Robotics. It allows robots to also act autonomously i.e. it is an adaptive feature which has the ability to add human touch to robots. It is a cutting edge technology with cognitive functions embeded in robots. The field of Robotics has many advantages for humankind. However, in its different fields of application robots also pose threat to mankind. Therefore, for a comprehensive understanding of Robotics, its application in different fields and its associated advantages and disadvantages needs holistic evaluation for mankind.

The vast majority of robots do have several qualities in common. First of all, almost all robots have a movable body. Some only have motorised wheels, and other have dozens of movable segments, typically made of metal or plastic. Like the bones in our body, the individual segments are connected together with joints. Robots spin wheels and pivot jointed segments with some sort of actuator. At the advent of industrial revolution in 18th century, robots made its foray in its most rudimentary form. However, remote controller devices and their operations started in 19th century in the form of guided missiles in navy called `Torpedoes'. Modern robots were invented in 20th century where IssacAsimor made landmark contribution in the field of Robotics.

However, Robots also have some disadvantages. They lack human touch But artificial intelligence is quickly filling the gap. Their employment in industries has led to retrenchment of labour force leading to unemployment. The developments in the field of Artificial Intelligence has started filling the gap between man and machine. But there are ethical questions, involved in Artificial Intelligence and Robotics. Therefore, we should tread cautiously in this field of technology. In its any form, technology should simplify lives of human but not at the cost of invading and undermining value of human lives.

SOME INTRESTING FACTS

Mr. Smarajit Samal ,3nd year ,Mechanical

- **The first domain name ever registered wasSymbolics.com.**
- **U.S. President Bill Clinton's inauguration in January 1997 was the first to bewebcast.**
- **Every minute, 10 hours of videos are uploaded on Youtube.**
- **While it took the radio 38 years, and the television a short 13 years, it took the World WideWeb only 4 years to reach 50 millionusers.**
- **'Stewardesses' is the longest word which can be typed with only the lefthand.**
- **If you were to remove all of the empty space from the atoms that make up every humanon earth, the entire world population could fit into anapple.**
- **GoogleusesanestimatedbillionkWhofelectricityperyear,morethanmost countries.**
- **However, Google generates a lot of their own power with their solar panels.**

Technical Quiz

By: Mr. Sandeep Mohanty, 4th Year MECH

1 When two vapor cycles are coupled in series and heat rejected by one is absorbed by another, the cycle is called as

a. Dual vapour cycle

b. Binary vapour cycle

c. Coupled vapour cycle

d. none of the above

2. As the heat rejection temperature decreases in the vapour power cycle below atmospheric pressure,

a. the vacuum in the condenser also decreases

b. the vacuum in the condenser increases

c. it does not produce any vacuum in condenser

d. none of the above

3. A closed feed water heater system

a. has high heat transfer capacity

b. requires pump at each heater to handle the large feed water stream

c. requires only single pump regardless of the number of heaters

d. does not require any pump as the extracted steam and feed water are not allowed to mix

4. What is the relation between efficiencies of Rankine cycle and Carnot cycle for the same press ratio?

a. (ηRankine) = (ηCarnot)

b. (ηRankine) > (ηCarnot)

c. (ηRankine) < (ηCarnot)

d. none of the above

5. What is the effect of superheated steam on efficiency of Rankine cycle?

a. efficiency of Rankine cycle decreases with increase in superheat of the steam

b. efficiency of Rankine cycle increases with increase in superheat of the steam

c. efficiency of Rankine cycle is not affected by change in superheat of the steam

d. none of the above

6. The thermal efficiency of a standard Otto cycle for a compression ratio of 5.5 will be
a) 25%
b) 50%
c) 70%
d) 100%

7. The Otto cycle consists of
a) two constant pressure processes and two constant volume processes
b) two constant pressure and two constant entropy processes
c) two constant volume processes and two constant entropy processes
d) none of the mentioned

8The mean effective pressure of an Otto Cycle increases with an increase in
a) pressure ratio
b) compression ratio
c) temperature ratio
d) none of the mentioned

9If compression ratio of an engine working on Otto cycle is increased from 5 to 7, the percentage increase in efficiency will be
a) 2%
b) 4%
c) 8%
d) 14%

10In a diesel engine, the fuel is ignited by
a) spark
b) injected fuel
c) heat resulting from compressing air that is supplied for combustion
d) combustion chamber

Answers

1. B
2. B
3. C
4. C
5. B
6. B
7. C
8. B
9. D
10. B

ABBRIVIATION

A/C - Air Conditioning

CAD - Computer Aided Design

CCTV - Closed Circuit Television

CONT - Continuous

DP - Downpipe

DWG - Drawing

EWB - Electric Water Boiler

FW - Fillet Weld

HR - Hot Rolled

LPG - Liquid Petroleum Gas

MS - Mild Steel

GREAT QUOTE

Mr. Sourav Mishra ,2nd year ,Mechanical

"The day science begins to study non-physical phenomena, it will make more progress in one decade than in all the previous centuries of its existence." –

Nikola Tesla

The first steps in the path of discover, and the first approximate measures, are those which add most to the existing knowledge of mankind." –

Charles Babbag

""What you call freedom is still nothing but choosing how to steer straight into the heart of what chooses you" –

Kate Gleason

"Whatever course you decide upon, there is always someone to tell you that you are wrong. There are always difficulties arising that tempt you to believe your critics are right. To map out a course of action and follow it to an end requires some of the same courage that a soldier needs. Peace has its victories, but it takes brave men and women to win them. "

- *Ralph Waldo Emerson*