Mechanical Power Engineering Department B.Sc. Programme Specification

مقدمـــة

الهندسة هى المعرفة بالعلوم الطبيعية والرياضية، والتى تكتسب بالدراسة والخبرة والممارسة، وتطبق بوعى لتطوير أساليب تستخدم اقتصاديا لتطويع المواد وقوى الطبيعة لصالح البشريّة، وهى أيضا المقدرة على الشروع في النشاط والسلوك المرتبط بالعمليات الهندسية والنظم والمشاكل والفرص، والتاريخ، والمستقبل، والتأثيرات، والأخلاق والمردودات. كما أنها تنطوى على المعرفة، وطرق التفكير والتصرفات والقدرات. كما تساعد الهندسة في إعداد الأفراد لتقديم خيارات مدروسة في إطار كونهم مستهلكين أو عمالا أو مواطنين وأعضاء فى المجتمع والبيئة المحيطة. وينبغي أن يحقق التعليم الهندسي التميز والتفوق في التعليم العالى والدراسات العليا والبحوث، والخدمة العامة، وتطوير المعارف الهندسية. ويهدف التعليم الهندسى الى تخريج مهندسين موهوبين، واسعى المعرفة على درجة عالية من الكفاءة، بالإضافة إلى إنتاج بحوث وتقنيات مفيدة وخلاقة من خلال التفوق والتميز الأكاديمي. علاوة على ذلك فإن التعليم الهندسى يهدف إلى تحفيز الطلاب وأعضاء هيئة التدريس على التعلم والنمو، كذلك تحقيق وتلبية احتياجات المجتمع قوميًّا وإقليميًّا ودوليًّا. كما يهدف أيضا إلى إعداد الطّلبة لمهنة منتجة ومفيدة في المجال الهندسى مبنية على أسس أخلاقية ومعنوية قوية.

وقسم هندسة القوى الميكانيكية يقوم بدور هام وأساسى فى إعداد المهندسين إعدادا أكاديمياً وعملياً في مجالات الطاقة والموائع وأنظمة الإحتراق ومحركات وسائل النقل الخفيف والثقيل والدفع النفاث ومحطات توليد الطاقة الكهربية الحرارية والبخارية والنووية وتشغيل الآلات والأجهزة المستخدمة في مختلف قطاعات النشاطات الاقتصادية ذات الصلة بتخصص الطاقة وتحويلاتها وبما يتلائم مع متطلبات خطط التنمية وما يحتاجه الوطن من سواعد أبنائه القادرة على المشاركة الفعالة في بناء وتحقيق تقدمه ورفاهية أبناءه. كما يقوم القسم بدور فعال فى مجال البحث العلمى التطبيقى بما يحقق إيجاد حلول مبتكرة للمشكلات المختلفة وتقديم الخدمات الفنية والتعاون مع مؤسسات المجتمع المدنى والشركات والمصانع ذات الصلة بتخصص الطاقة والموائع والقوى الميكانيكية.

وأيضاً قسم هندسة القوى الميكانيكية يوفر أساسا للمهن الهندسية في صناعات القطاع الخاص وقطاع الأعمال والقطاع الحكومي والمنطقة العربية بالتخصصات المطلوبة وخاصة فى مجال الطاقة والموائع وتوليد الكهرباء والتبريد وتكييف الهواء وتحلية المياه ، فمهندس القوى الميكانيكية يعمل في مجال واسع من الصناعات مثل الصناعات المعدنية وإنتاج ونقل وتكرير البترول والغاز والصناعات التحويلية والطاقة والمواد الغذائية والطبية وغيرها، حيث أن تخصص هندسة القوى الميكانيكية من التخصصات الهندسية الأساسية الأكثر اتساعاً وشمولاً لكل التطبيقات الهندسية المختلفة، فهو يغطى مساحات واسعة جداً مثل النظم الميكانيكية والحرارية ونظم تحويل الطاقة وتوليد القدرة الميكانيكية والكهربية ، ويشمل أيضاً طرق نقل القدرة من خلال تصميم وإنتاج واستخدام الوسائل الخاصة بذلك مثل المبادلات الحرارية ، الغلايات ، التربينات ، أبراج التبريد ، إسالة الغازات الطبيعية ، خطوط نقل الغاز والبترول والمياه ومنظومات التبريد وتكييف الهواء المركزي ، تحلية المياه ، الطاقة الجديدة والمتجددة والطاقة الشمسية وطاقة الرياح.

وقسم هندسة القوى الميكانيكية إذ يقدم هذه الوثيقة الهامة للهيئة القومية لضمان جودة التعليم والإعتماد ، فإنه يتقدم بالشكر لجميع أعضاء هيئة التدريس بالقسم وخاصة استاذ دكتور صبيح سليم مقرر البرنامج بالقسم وكل رؤساء اللجان الفرعية الذين تضافرت جهودهم لإنجازهذه الوثيقة، كما يقدم الشكر والتقدير لمكتب الجودة بالمؤسسة الذى وفر الخبرات اللازمة والتدريب والاستشارات لإتمام مواصفات هذا البرنامج.

والله ولى التوفيق،،،

رئيس القسم

أستاذ دكتور/ موسى محمد محمد موسى

Content

Faculty of Engineering – Menofiya Unversity

Undergraduate Programs

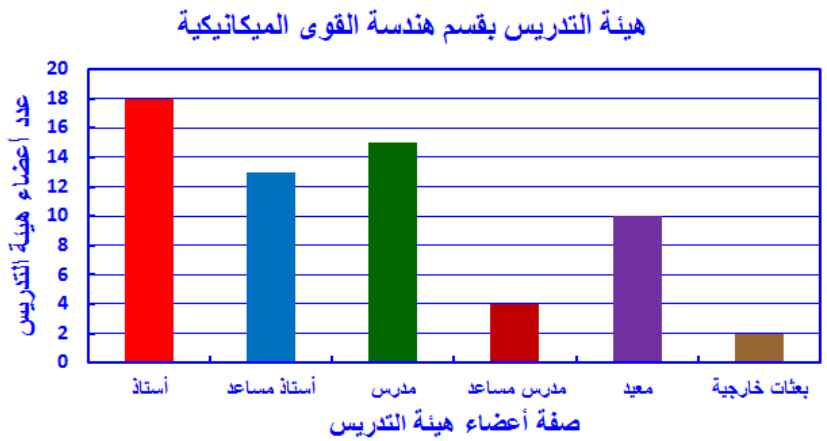
Mechanical Power Engineering
Programme Specification

1. General
1.1 Basic information:

1- Programme name	**Mechanical Power Engineering**
2- Programme type	**Single**
3- Adoption Date	**2003**
4- Study system	**Semester System**
5- Cordinator	**Prof.Dr. Sobeih M. A. Selim**
6- External Evaluator(s)	**Prof. Dr. Galal Rabie**
7- Academic Standard	**The program adopts the National Academic Reference Standards (NARS) issued by the National Authority for Quality Assurance and Accreditation in Education (NAQAAE), August 2009 edition.**

1.2. Faculty Members in Mechanical power Engineering Department

The Mechanical Power Engineering B. Sc. Program courses are taught by 31 highly qualified Faculty members from the MPE and. They are qualified to teach the courses allocated to them. Their personnel resume are included in the courses files. The following figure shows the distribution of the faculty members in the department.



1.3 Programme External Reviewin

The program specifications were evaluated by one external evaluator. Their evaluation showed that the program specifications agree with the National Academic Reference Standards (NARS). However, the reviewer gaves objective comments, which were considered in the final version of the program specifications. The reviewers report and response to their comments are printed in a separate document.

2. Programme Mission and Aims

The Mechanical Power Engineering Department plays an important role in preparing engineers academically and practically in the fields of energy, fluids, combustion systems , transportation engines, jet propulsion, electrical power plants of thermal and steam, and nuclear power stations. The operation of machines and devices used in various sectors of economic activities related to the specialization of energy conversions which including the requirements of development plans and the needs of the nation. The department played an active role in the field of applied scientific research in order to achieve innovative solutions to various problems and provide technical services and cooperation with civil society organizations, businesses and factories related to the specialization of energy, fluid and mechanical forces. It covers areas of technical and very wide , such as design, production and use of special means as heat exchangers, boilers, turbines, cooling towers, the liquefaction of natural gas, gas transmission lines, oil and water ... etc.) , as well as systems, refrigeration and air conditioning, desalination, new and renewable energy, solar and wind energy.

2.1 Faculty Mission

The Mission of the Faculty of Engineering menoufiya University "Graduating generations of engineers with innovative capability technological creativeness and competition in the labor market through application of the latest

education and learning systems in engineering disciplines and programmes available as well as conduction scientific research and providing training programs that contribute to community service and development of the environment .

2.2 Programme Mission

The mission of the Mechanical power Engineering Programme stems from the mission of the Faculty of Engineering menoufiya University. The mission of the Mechanical power Engineering Department at the Faculty of Engineering Menoufiya University at shibin El-Kim is threefold:

- **Educate the next generation of leaders in the mechanical power engineering profession according to the National Education Quality Standards.**
- **Create, explore, and develop innovation in engineering science and technology.**
- **Provide beneficial service to the local, national, and international communities.**

2.3 Promramme Aims

The Mechanical Power Engineering Department at the Faculty of Engineering , Menoufyia University is dedicated to graduating mechanical power engineering Who:

1. **Practice mechanical power engineering in the general stems of thermal / Fluid devices processes and systems , design , operate and maintain in industry and government setting.**
2. **Are prepared for advanced education, research and development, and other creative efforts in science and technology.**
3. **Conduct them in a responsible, professional, and ethical manner.**

Participate as leaders in activities that support service to economic development of region governorate and nation.

3 PROGRAMME ACADEMIC REFERENCE STANDARDS

National Academic Reference Standards

3.1 : (NARS) Attributes of Engineer and Mechanical Power Engineer .

The engineer must have the ability to :

General Engineer Attributas	**1- Apply knowledge of mathematics, science and engineering concepts to the solution of engineering problems.** **2- Design a system; component and process to meet the required needs within realistic constraints.** **3- Design and conduct experiments as well as analyze and interpret data.** **4- Identify, formulate and solve fundamental engineering problems.** **5- Use the techniques, skills, and appropriate engineering tools, necessary for engineering practice and project management.** **6- Work effectively within multi-disciplinary teams.** **7- Communicate effectively.** **8- Consider the impacts of engineering solutions on society & environment.** **9- Demonstrate knowledge of contemporary engineering issues.** **10-Display professional and ethical responsibilities; and contextual understanding** **11- Engage in self- and life- long learning.**
Mechanical Power attributes Engineers	**12-Evaluate the sustainability and environmental issues related to mechanical power systems.** **13-Use energy efficiently.** **14-Apply industrial safety.** **15-Apply and integrate knowledge, understanding and skills of different subjects and available computer software to solve real problems in industries and power stations.** **16-Lead or supervise a group of engineers, technicians and work force.** **17-Carry out preliminary designs of fluid transmission and power systems, investigate their performance and solve their essential operational problems.** **18-Design, operate and maintain internal combustion and steam engines.**

3.2 National Academic Reference Standards (NARS) for Engineering and NARS for Mechenical power Engineering:

Knowledge & Understanding	By the end of the programme, graduate should demonstrate knowledge and understanding of:	
	Engineering	**A.1) Concepts and theories of mathematics and sciences, appropriate to the Mechanical Power Engineering.** **A.2) Basics of information and communication technology (ICT)** **A.3) Characteristics of engineering materials related to the Mechanical Power Engineering.** **A.4) Principles of design including elements design, process and/or a system related to Mechanical PowerEngineering.** **A.5) Methodologies of solving engineering problems, data collection and interpretation** **A.6) Quality assurance systems, codes of practice and standards, health and safety requirements and environmental issues.** **A.7) Business and management principles relevant to engineering.** **A.8) Current engineering technologies as related to Mechanical Power Engineering.** **A.9) Topics related to humanitarian interests and moral issues.** **A.10) Technical language and report writing** **A.11) Professional ethics and impacts of engineering solutions on society and environment** **A.12) Contemporary engineering topics.**
	Power Engineering	**A.13) Fundamentals of thermal and fluid processes** **A.14) Internal combustion, pumps, turbines and compressors, classification, construction design concepts, operation and characteristics** **A.15) Fluid power systems** **A.16) The constraints which mechanical power engineers have to judge to reach at an optimum solution.** **A.17) Business and management techniques and practices appropriate to mechanical power engineering applications.** **A.18) Mechanical power engineerin contemporary issues.** **A.19) .Basic theories and principles of some other engineering and mechanical engineering disciplines providing support to Mechanical Power**
Intellectual Skills	**By the end of the programme, graduate should be able to:**	
	Engineering	**B.1) Select appropriate mathematical and computer-based methods for modeling and analyzing problems.** **B.2) Select appropriate solutions for engineering problems based on analytical thinking.** **B.3) Think in a creative and innovative way in problem solving and design.** **B.4) Combine, exchange, and assess different ideas, views, and knowledge from a range of sources.** **B.5) Assess and evaluate the characteristics and performance of components, systems and processes.** **B.6) Investigate the failure of components, systems, and processes.** **B.7) Solve engineering problems, often on the basis of limited and possibly contradicting information.** **B.8) Select and appraise appropriate ICT tools to a variety of engineering problems.** **B.9) Judge engineering decisions considering balanced costs, benefits, safety, quality, reliability, and environmental impact.** **B.10) Incorporate economic, societal, and environmental and risk management dimensions in design.** **B.11) Analyze results of numerical models and assess their limitations.** **B.12) Innovate systematic and methodic approaches when dealing with new and advancing technology.**
	Engineering	**B.13) Evaluate mechanical power and energy engineering designs, processes and performances and propose improvements.** **B.14) Analyze and interpret data, and design experiments to obtain new data.** **B.15) Evaluate the power losses in the fluid transmission lines and networks** **B.16) Analyze the performance of the basic types of internal combustion engines and hydraulic machines** **B.17) Analysis of fluid power systems, subsystems and various control valves and actuators**

Professional Skills

By the end of the programme, graduate should be able to:

Engineering

- **C.1) Apply knowledge of mathematics, science, information technology, design, business context and engineering practice integrally to solve engineering problems.**
- **C.2) Professionally merge the engineering knowledge, understanding, and feedback to improve design, products and/or services.**
- **C.3) Create and/or re-design a process, component or system, and carry out specialized engineering designs.**
- **C.4) Practice the neatness and aesthetics in design and approach.**
- **C.5) Use computational facilities and techniques, measuring instruments, workshops and laboratory equipment to design experiments, collect, analyze and interpret results.**
- **C.6) Use a wide range of analytical tools, techniques, equipment, and software packages pertaining to the discipline and develop required computer programs.**
- **C.7) Apply numerical modeling methods to engineering problems.**
- **C.8) Apply safe systems at work and observe the appropriate steps to manage risks.**
- **C.9) Demonstrate basic organizational and project management skills.**
- **C.10) Apply quality assurance procedures and follow codes and standards.**
- **C.11) Exchange knowledge and skills with engineering community and industry.**
- **C.12) Prepare and present technical reports.**

Power Engineering

- **C.13) Use basic workshop equipment safely and appropriately.**
- **C.14) Prepare engineering drawings, computer graphics and specialized technical reports.**
- **C.15) Write computer programs pertaining to mechanical power and energy engineering.**
- **C.16) Describe the basic Thermal and fluid processes mathematically and use the computer software for their simulation and analysis**
- **C.17) Design, operate, repair and maintain fluid hydraulic power systems for diverse applications**
- **C.18) Carry out preliminary designs of fluid transmission networks, internal combustion and steam engines and solve their operational problems.**
- **C.19) Work in mechanical power and energy operations, maintenance and overhaul.**

General Skills

By the end of the program, graduate should be able to:

Enginering

- **D.1) Collaborate effectively within multidisciplinary team.**
- **D.2) Work in stressful environment and within constraints.**
- **D.3) Communicate effectively.**
- **D.4) Demonstrate efficient IT capabilities.**
- **D.5) Lead and motivate individuals.**
- **D.6) Effectively manage tasks, time, and resources.**
- **D.7) Search for information and engage in life-long self learning discipline.**
- **D.8) Acquire entrepreneurial skills.**
- **D.9) Refer to relevant literatures.**

4- RELATIONSHIP BETWEEN NARS GRADUATE ATTRIBUTES AND MECHANICAL POWER ENGINEER PROGRAMME AIMS

NARS Attributes of Engineers and Mechanical Power and Energy Engineerers		Programme Aims			
		O1	O2	O3	O4
NARS Attributes of Engineers (General)	1- Apply knowledge of mathematics, science and engineering concepts to the solution of engineering problems.	*			
	2- Design a system; component and process to meet the required needs within realistic constraints.	*			
	3- Design and conduct experiments as well as analyze and interpret data.		*		
	4- Identify, formulate and solve fundamental engineering problems.	*	*		
	5- Use the techniques, skills, and appropriate engineering tools, necessary for engineering practice and project management.	*			*
	6- Work effectively within multi-disciplinary teams.			*	
	7- Communicate effectively.			*	
	8- Consider the impacts of engineering solutions on society & environment.				*
	9- Demonstrate knowledge of contemporary engineering issues.		*		
	10- Display professional and ethical responsibilities; and contextual understanding			*	
NARS Attributes of the mech. Power and energy engineers	11- Engage in self- and life- long learning.		*		
	12- Evaluate the sustainability and environmental issues related to mechanical power systems.				*
	13- Use energy efficiently.		*		*
	14- Apply industrial safety.			*	
	15- Apply and integrate knowledge, understanding and skills of different subjects	*			

	and available computer software to solve real problems in industries and power stations.				
	16- Lead or supervise a group of engineers, technicians and work force.			*	
	17- Carry out preliminary designs of fluid transmission and power systems, investigate their performance and solve their essential operational problems.	*			
	18- Design, operate and maintain internal combustion and steam engines.	*			

5- RELATIONSHIP BETWEEN ACADEMIC STANDARDS AND PROGRAM OBJECTICES

	(NARS) Academic Standards	Programme Aims			
		O1	O2	O3	O4
Knowledge and Understanding	**A.1) Concepts and theories of mathematics and sciences, appropriate to the mechanical power.**	*	*		*
	A.2) Basics of information and communication technology (ICT)	*	*	*	*
	A.3) Characteristics of engineering materials related to the mechanical power engineering.	*	*	*	*
	A.4) Principles of design including elements design, process and/or a system related to Mechanical Power Engineering.	*	*		*
	A.5) Methodologies of solving engineering problems, data collection and interpretation	*	*		*
	A.6) Quality assurance systems, codes of practice and standards, health and safety requirements and environmental issues.	*	*	*	*
	A.7) Business and management principles relevant to engineering.	*	*		*
	A.8) Current engineering technologies as related to Mechanical Power Engineering.	*	*		*
	A.9) Topics related to humanitarian interests and moral issues.	*		*	*
	A.10)Technical language and report writing		*	*	*
	A.11)Professional ethics and impacts of engineering solutions on society and environment		*	*	*
	A.12)Contemporary engineering topics.	*	*		
	A.13)Fundamentals of thermal and fluid processes	*	*		
	A.14)Internal combustion, pumps, turbines and compressors, classification, construction design concepts, operation and characteristics	*	*		*
	A.15)Fluid power systems	*	*		*
	A.16)The constraints which mechanical power engineers have to judge to reach at an optimum solution.	*	*	*	*
	A.17)Business and management techniques and practices appropriate to mechanical power engineering applications.	*	*		*
	A.18) Mechanical power engineerin contemporary issues.	*	*		
	A.19).Basic theories and principles of some other engineering and mechanical engineering providing support to mechanical power engineering	*		*	
al	**B.1) Select appropriate mathematical and computer-based methods for modeling and analyzing problems.**	*	*		
	B.2) Select appropriate solutions for engineering problems based on analytical	*	*		

	thinking.				
	B.3) Think in a creative and innovative way in problem solving and design.	*	*		
	B.4) Combine, exchange, and assess different ideas, views, and knowledge from a range of sources.	*	*		*
	B.5) Assess and evaluate the characteristics and performance of components, systems and processes.	*	*		*
	B.6) Investigate the failure of components, systems, and processes.	*	*		
	B.7) Solve engineering problems, often on the basis of limited and possibly contradicting information.	*	*		*
	B.8) Select and appraise appropriate ICT tools to a variety of engineering problems.	*	*		*
	B.9) Judge engineering decisions considering balanced costs, benefits, safety, quality, reliability, and environmental impact.	*	*	*	*
	B.10) Incorporate economic, societal, environmental and risk management dimensions in design.	*	*	*	*
	B.11) Analyze results of numerical models and assess their limitations.	*			*
	B.12) Innovate systematic and methodic approaches when dealing with new and advancing technology.	*	*	*	*
	B.13) Evaluate mechanical power and energy engineering designs, processes and performances and propose improvements.	*			*
	B.14) Analyze and interpret data, and design experiments to obtain new data		*		
	B.15) Evaluate the power losses in the fluid transmission lines and networks	*			
	B.16) Analyze the performance of the basic types of internal combustion engines and hydraulic machines	*			
	B.17) Analysis of fluid power systems, subsystems and various	*			
Professional Skills	**C.1) Apply knowledge of mathematics, science, information technology, design, business context and engineering practice integrally to solve engineering problems.**	*	*		*
	C.2) Professionally merge the engineering knowledge, understanding, and feedback to improve design, products and/or services.	*	*		*
	C.3) Create and/or re-design a process, component or system, and carry out specialized engineering designs.	*	*		*
	C.4) Practice the neatness and aesthetics in design and approach.	*		*	*
	C.5) Use computational facilities and techniques, measuring instruments, workshops and laboratory equipment to design experiments, collect, analyze and interpret results.	*	*		*
	C.6) Use a wide range of analytical tools, techniques, equipment, and software packages pertaining to the mechanical power and develop required computer programs.	*	*		*
	C.7) Apply numerical modeling methods to engineering problems.	*	*		
	C.8) Apply safe systems at work and observe the appropriate steps to manage risks.	*	*	*	*
	C.9) Demonstrate basic organizational and project management skills.	*		*	*
	C.10) Apply quality assurance procedures and follow codes and standards.	*		*	*
	C.11) Exchange knowledge and skills with engineering community and industry.		*	*	
	C.12) Prepare and present technical reports.		*	*	
	C.13) Use basic workshop equipment safely and appropriately.			*	
	C.14) Prepare engineering drawings, computer graphics and specialized technical reports.			*	
	C.15) Write computer programs pertaining to mechanical power and energy engineering.	*			*
	C.16) Describe the basic Thermal and fluid processes mathematically and use the computer software for their simulation and analysis	*			

	C.17) Design, operate, repair and maintain fluid hydraulic power systems for diverse applications	*			
	C.18) Carry out preliminary designs of fluid transmission networks, internal combustion and steam engines and solve their operational problems.	*			
	C.19) Work in mechanical power and energy operations, maintenance and overhaul.	*	*		*
General Skills	**D.1) Collaborate effectively within multidisciplinary team.**			*	
	D.2) Work in stressful environment and within constraints.			*	*
	D.3) Communicate effectively.			*	
	D.4) Demonstrate efficient IT capabilities.	*			*
	D.5) Lead and motivate individuals.			*	
	D.6) Effectively manage tasks, time, and resources.	*		*	*
	D.7) Search for information and engage in life-long self learning mechanical power.	*	*		
	D.8) Acquire entrepreneurial skills.	*	*	*	*
	D.9) Refer to relevant literatures.		*	*	*

6-INTENDED LEARNING OUTCOMES (ILOS) OF THE PROGRAMME ACADEMIC REFERENCE STANDARDS

The program extracts its Intended Learning Outcomes (ILOs) from the National Academic Reference Standards (NARS) for Engineering and NARS for Characterization as follows:

Academic Reference Standards NARS			Intended Learning Outcomes (ILOs) of the programme
Knowledge and understanding	**By the end of the programme, student should be able to demonstrate knowledge and understanding of:**		**By the end of the programme, student should be able to:**
	Engineering	A.1) Concepts and theories of mathematics and sciences, appropriate to the discipline mechanical power engineering.	A.1) **Discuss** concepts and theories of mathematics and sciences, appropriate to the mechanical power engineering.
		A.2) Basics of information and communication technology (ICT)	A.2) **Recognise** Basics of information and communication technology (ICT)
		A.3) Characteristics of engineering materials related to the mechanical power engineering.	A.3) **Classify** Characteristics of engineering materials related to the mechanical power engineering.
		A.4) Principles of design including elements design, process and/or a system related to Mechanical Power Engineering.	A.4) **List** Principles of design including elements design, process and/or a system related to specific Mechanical Power Engineering.
		A.5) Methodologies of solving engineering problems, data collection and interpretation	A.5) **Recognise** Methodologies of solving engineering problems, data collection and interpretation
		A.6) Quality assurance systems, codes of practice and standards, health and safety requirements and environmental issues.	A.6) **Explain** Quality assurance systems, codes of practice and standards, health and safety requirements and environmental issues.
		A.7) Business and management principles relevant to engineering.	A.7) **Underline** business and management principles relevant to engineering.
		A.8) Current engineering technologies as related to Mechanical Power Engineering.	A.8) Identify Current engineering technologies as related to Mechanical Power engineering.
		A.9) Topics related to humanitarian interests and moral issues.	A.9) Discuss topics related to humanitarian interests and moral issues.
		A.10)Technical language and report writing	A.10) Write reports using technical language.

Academic Reference Standards NARS			Intended Learning Outcomes (ILOs) of the programme
		A.11)Professional ethics and impacts of engineering solutions on society and environment	A.11) Discuss professional ethics and realize impacts of engineering solutions on society and environment
		A.12)Contemporary engineering topics.	A.12) Discuss contemporary engineering topics.
	Power Engineering	A.13)Fundamentals of thermal and fluid processes	A.13) List fundamentals of thermal and fluid processes
		A.14)Internal combustion, pumps, turbines and compressors, classification, construction design concepts, operation and characteristics	A.14) Recognise the working principles of internal combustion, pumps, turbines and compressors, classification, construction design concepts, operation and characteristics
		A.15)Fluid power systems	A.15) **Design** and troubleshoot Fluid power systems
		A.16)The constraints which mechanical power engineers have to judge to reach at an optimum solution.	A.16) **Recognize** the constraints that limits mechanical power engineers ability to reach an optimum solution.
		A.17)Business and management techniques and practices appropriate to mechanical power engineering applications.	A.17) **Describe** business and management techniques and practices appropriate to mechanical power engineering applications.
		A.18)Mechanical power engineerin contemporary issues.	A.18) **Discuss** mechanical power engineerin contemporary issues.
		A.19)Basic theories and principles of some other engineering and mechanical engineering Mechanical Power providing support to mechanical power Mechanical Power	A.19) Define basic theories and principles of some other engineering and mechanical engineering Mechanical Power providing support to mechanical power Mechanical Power
Intellectual Skills	**Engineering**	B.1)Select appropriate mathematical and computer-based methods for modeling and analyzing problems.	B.1)**Select** appropriate mathematical and computer-based methods for modeling and analyzing problems.
		B.2)Select appropriate solutions for engineering problems based on analytical thinking.	B.2) **Select** appropriate solutions for engineering problems based on analytical thinking.
		B.3)Think in a creative and innovative way in problem solving and design.	B.3) **Arrange** in a creative and innovative way in problem solving and design.
		B.4)Combine, exchange, and assess different ideas, views, and knowledge from a range of sources.	B.4) **Combine**, exchange, and assess different ideas, views, and knowledge from a range of sources.
		B.5)Assess and evaluate the characteristics and performance of components, systems and processes.	B.5) **Assess** and evaluate the characteristics and performance of components, systems and processes.
		B.6)Investigate the failure of components, systems, and processes.	B.6) **Investigate** the failure of components, systems, and processes.
		B.7)Solve engineering problems, often on the basis of limited and possibly contradicting information.	B.7) **Solve** engineering problems, often on the basis of limited and possibly contradicting information.
		B.8)Select and appraise appropriate ICT tools to a variety of engineering problems.	B.8) **Select** and appraise appropriate ICT tools to a variety of engineering problems.
		B.9)Judge engineering decisions considering balanced costs, benefits, safety, quality, reliability, and environmental impact.	B.9) **Judge** engineering decisions considering balanced costs, benefits, safety, quality, reliability, and environmental impact.
		B.10) Incorporate economic, societal, environmental and risk management dimensions in design.	B.10) **Incorporate** economic, societal, environmental and risk management dimensions in design.
		B.11) Analyze results of numerical models and assess their limitations.	B.11) **Analyze** results of numerical models and assess their limitations.
		B.12) Innovate systematic and methodic approaches when dealing with new and advancing technology.	B.12) Innovate systematic and methodic approaches when dealing with new and advancing technology.

Academic Reference Standards NARS			Intended Learning Outcomes (ILOs) of the programme
	Power Engineering	B.13) Evaluate mechanical power and energy engineering designs, processes and performances and propose improvements.	B.13) **Evaluate** mechanical power and energy engineering designs, processes and performances and propose improvements.
		B.14) Analyze and interpret data, and design experiments to obtain new data	B.14) Analyze and interpret data, and design experiments to obtain new data
		B.15) Evaluate the power losses in the fluid transmission lines and networks	B.15) Evaluate the power losses in the fluid transmission lines and networks
		B.16) Analyze the performance of the basic types of internal combustion engines and hydraulic machines	B.16) Analyze the performance of the basic types of internal combustion engines and hydraulic machines
		B.17) Analysis of fluid power systems, subsystems and various	B.17) **Analyze** of fluid power systems, subsystems and various
Professional Skills	**Engineering**	C.1) Apply knowledge of mathematics, science, information technology, design, business context and engineering practice integrally to solve engineering problems.	C.1) **Apply** knowledge of mathematics, science, information technology, design, business context and engineering practice integrally to solve engineering problems.
		C.2) Professionally merge the engineering knowledge, understanding, and feedback to improve design, products and/or services.	C.2) Compose the engineering knowledge, understanding, and feedback to improve design, products and/or services.
		C.3) Create and/or re-design a process, component or system, and carry out specialized engineering designs.	C.3) **Create** and/or re-design a process, component or system, and carry out specialized engineering designs.
		C.4) Practice the neatness and aesthetics in design and approach.	C.4) **Practice** the neatness and aesthetics in design and approach.
		C.5) Use computational facilities and techniques, measuring instruments, workshops and laboratory equipment to design experiments, collect, analyze and interpret results.	C.5) **Use** computational facilities and techniques, measuring instruments, workshops and laboratory equipment to design experiments, collect, analyze and interpret results.
		C.6) Use a wide range of analytical tools, techniques, equipment, and software packages pertaining to the mechanical power and develop required computer programs.	C.6) **Use** a wide range of analytical tools, techniques, equipment, and software packages pertaining to the mechanical power and develop required computer programs.
		C.7) Apply numerical modeling methods to engineering problems.	C.7) **Apply** numerical modeling methods to engineering problems.
		C.8) Apply safe systems at work and observe the appropriate steps to manage risks.	C.8) **Apply** safe systems at work and observe the appropriate steps to manage risks.
		C.9) Demonstrate basic organizational and project management skills.	C.9) **Demonstrate** basic organizational and project management skills.
		C.10) Apply quality assurance procedures and follow codes and standards.	C.10) **Apply** quality assurance procedures and follow codes and standards.
		C.11) Exchange knowledge and skills with engineering community and industry.	C.11) **Exchange** knowledge and skills with engineering community and industry.
		C.12) Prepare and present technical reports.	C.12) **Prepare** and **present** technical reports.
	Power Engineering	C.13) Use basic workshop equipment safely and appropriately.	C.13) **Use** basic workshop equipment safely and appropriately.
		C.14) Prepare engineering drawings, computer graphics and specialized technical reports.	C.14) **Prepare** engineering drawings, computer graphics and specialized technical reports.
		C.15) Write computer programs pertaining to mechanical power and energy engineering.	C.15) **Write** computer programs pertaining to mechanical power and energy engineering.

Academic Reference Standards NARS			Intended Learning Outcomes (ILOs) of the programme
		C.16) Describe the basic Thermal and fluid processes mathematically and use the computer software for their simulation and analysis	C.16) **Describe** the basic Thermal and fluid processes mathematically and use the computer software for their simulation and analysis
		C.17) Design, operate, repair and maintain fluid hydraulic power systems for diverse applications	C.17) **Design**, operate, repair and maintain fluid hydraulic power systems for diverse applications
		C.18) Carry out preliminary designs of fluid transmission networks, internal combustion and steam engines and solve their operational problems.	C.18) **Carry out** preliminary designs of fluid transmission networks, internal combustion and steam engines and solve their operational problems.
		C.19) Work in mechanical power and energy operations, maintenance and overhaul.	C.19) Work in mechanical power and energy operations, maintenance and overhaul.
General Skills		D.1) Collaborate effectively within multidisciplinary team.	D.1) **Collaborate** effectively within multidisciplinary team.
		D.2) Work in stressful environment and within constraints.	D.2) **Work** in stressful environment and within constraints.
		D.3) Communicate effectively.	D.3) **Communicate** effectively.
		D.4) Demonstrate efficient IT capabilities.	D.4) **Demonstrate** efficient IT capabilities.
		D.5) Lead and motivate individuals.	D.5) **Lead** and **motivate** individuals.
		D.6) Effectively manage tasks, time, and resources.	D.6) **Manage** tasks, time, and resources effectively.
		D.7) Search for information and engage in life-long self learning mechanical power.	D.7) **Search for** information and engage in life-long self learning mechanical power.
		D.8) Acquire entrepreneurial skills.	D.8) **Acquire** entrepreneurial skills.
		D.9) Refer to relevant literatures.	D.9) **Refer to** relevant literatures.

7-RELATIONSHIP BETWEEN PROGRAMME ILOS AND COURSES

Intended Learning Outcomes (ILOs) of the programme			Courses that assess in realizing ILOs
	By the end of the program, student should be able to:		
Knowledg and understanding	Engineering	A.1) **Discuss** Concepts and theories of mathematics and sciences, appropriate to the mechanical power engineering.	BES 011 , BES 012 , BES 003 , BES 013 , PRE 001 , BES 014 , BES 021 , BES 022 , BES 003 , BES 013 , PRE 001 , BES 116 , PRE 118 , MPE112 , BES 122 , PRE 126 , BES 212 , ELE 217 , MPE224 , MPE422
		A.2) **Recognise** Basics of information and communication technology (ICT)	ELE 021 , MPE223 , MPE322 , MPE415a , MPE415b , MPE415C , MPE422 , MPE424c
		A.3) **Classify** Characteristics of engineering materials related to the mechanical power engineering.	BES 012 , BES 013 , PRE 011 , BES 014 , BES 022 , PRE 021 , BES 013 , PRE 129 , PRE 228
		A.4) **List** Principles of design including elements design, process and/or a system related to Mechanical Power Engineering..	PRE 001 , PRE 001 , MPE101 , PRE 118 , PRE 126 , MPE101 , MPE221 , PRE 228 , MPE413
		A.5) **Recognise** Methodologies of solving engineering problems, data collection and interpretation	BES 011 , BES 013 , BES 021 , BES 013 , MPE111 , MPE101 , ELE 117 , BES 122 , MPE101 , MPE212 , MPE321
		A.6) **Explain** Quality assurance systems, codes of practice and standards, health and safety requirements and environmental issues.	MPE101 , MPE101 , MPE314b , PRE327 , MPE325c , PRE429 , MPE424a
		A.7) **Underline** business and management principles relevant to engineering.	PRE327 , MPE412 . PRE429
		A.8) **Identify** Current engineering technologies as related to Mechanical Power Engineering.	PRE 011 , BES 014 , PRE 021 , MPE121 , PRE 128 , PRE 129 , BES 212 , PRE 228 , MPE314b , MPE413 , MPE415a , MPE415b , MPE415C
		A.9) **Discuss** topics related to humanitarian interests and moral issues.	BES 014 , BES 004 , ELE 021 , BES 004 , BES000
		A.10) **Write** reports using technical language.	BES 004 , BES 004 , MPE212 , ELE 217
		A.11) **Discuss professional** ethics and realize impacts of engineering solutions on society and environment	BES 013 , BES 013 , MPE314b , MPE325b , MPE325c , MPE412 , MPE424a
	Power Engineering	A.12) **Discuss** contemporary engineering topics.	PRE 129 , ELE 217 . MPE223 , MPE224 , MPE314b , PRE429 , MPE424a
		A.13) **List** fundamentals of thermal and fluid processes	MPE121 , MPE211 , MPE212 , MPE221 , PRE 228 , MPE222 , MPE311 , MPE312 , MPE313 , MPE314b , MPE424a
		A14) **Recognise the working principles** of internal combustion, pumps, turbines and compressors, classification, construction design concepts, operation and characteristics	MPE211 , MPE222 , MPE311 , MPE313 , MPE314c , MPE321 , MPE323 , MPE324 , MPE325a , MPE325b , MPE411 , MPE412 , MPE414b , MPE414c , MPE423a , MPE423b , MPE423c , MPE424b , MPE424c
		A.15) **Design and troubleshoot** Fluid power systems	ELE 319 , MPE314a , MPE414a , MPE421

Intended Learning Outcomes (ILOs) of the programme			Courses that assess in realizing ILOs
		A.16) **Recognize** the constraints that limits mechanical power engineers ability to reach an optimum solution.	PRE 228 , MPE321 , MPE324 , PRE327 , MPE412 , MPE414b , MPE414c
		A17) **Describe** business and management techniques and practices appropriate to mechanical power engineering applications.	ELE 319 , MPE325b , PRE429
		A18) **Discuss** mechanical power engineerin contemporary issues.	MPE223 , ELE 319 , MPE322 , MPE325c , MPE415a , MPE415b , MPE415C , MPE424a
		A19) **Define** basic theories and principles of some other engineering and mechanical engineering Mechanical Power providing support to mechanical power Mechanical Power	ELE 117 , PRE 218 , MPE223 , MPE224 , MPE412 , MPE413 , MPE422 , PRE429 , MPE423a
Intellectual Skills	**Engineering**	B.1) **Select** appropriate mathematical and computer-based methods for modeling and analyzing problems.	ELE 021 ,ELE 117 ,MPE112 ,MPE121 , BES 212 ,MPE221 ,PRE 228 ,MPE223 ,MPE224 ,MPE312 ,MPE322 , MPE406 ,MPE415a ,MPE415b ,MPE415C ,MPE422 ,MPE423a ,MPE406
		B.2) **Select** appropriate solutions for engineering problems based on analytical thinking.	BES 012 , BES 003 ,BES 013 ,BES 014 ,BES 022 BES 003, BES 013, MPE111 , PRE 118 , ELE 117 , MPE121 ,PRE126 PRE 129 , BES 212 , MPE211 ,PRE 218 , ELE 217,MPE221 ,MPE223 ,MPE312 ,PRE 228 ,MPE314b ,MPE321 ,MPE322 ,MPE324 , MPE325b , MPE412 ,MPE413 ,MPE406 ,MPE414b ,MPE414c ,MPE421 ,MPE422 ,MPE406 ,MPE423b
		B.3) **Arrange** in a creative and innovative way in problem solving and design.	BES 011 , BES 012 , BES 003 , PRE 011 , PRE 001, BES 021 , BES 022 , BES 003 , PRE 021 , PRE 001 , ELE 117 MPE121 , BES 122 , BES 212 , PRE 228 , MPE311 , MPE406 , MPE406
		B.4) **Combine**, exchange, and assess different ideas, views, and knowledge from a range of sources.	BES 004 , BES 004 , BES000 , MPE101 , ELE 117 , MPE101 , MPE321 , MPE406 , MPE406
		B.5) **Assess** and evaluate the characteristics and performance of components, systems and processes.	BES 116 , PRE 126 , MPE212 , , PRE 218 , MPE221 , , PRE 228 , MPE311 , MPE314c , MPE321 , MPE323 , MPE325a , MPE325c , MPE411 , MPE412 , MPE406 , MPE414b , MPE414c , MPE421 , MPE406 , MPE423b , MPE424a , MPE424c
		B.6) **Investigate** the failure of components, systems, and processes.	PRE 129 , PRE 218 , PRE 228 , MPE321 , PRE327 , MPE406 , MPE414c , MPE421 , MPE406 , MPE423
		B.7) **Solve** engineering problems, often on the basis of limited and possibly contradicting information.	PRE 118 , BES 212 , PRE 228 , MPE406 , MPE406

Intended Learning Outcomes (ILOs) of the programme			Courses that assess in realizing ILOs
		B.8) **Select** and appraise appropriate ICT tools to a variety of engineering problems.	ELE 021 , MPE224 , PRE327 , MPE406 , MPE415a , MPE415b , MPE415C , MPE422 , MPE406
		B.9) **Judge** engineering decisions considering balanced costs, benefits, safety, quality, reliability, and environmental impact.	BES 013 , BES 013 , MPE313 , MPE314b , MPE324 , PRE327 , MPE325c , MPE406 , PRE429 , MPE406 , MPE424a
		B.10) **Incorporate** economic, societal, environmental and risk management dimensions in design.	PRE327 , MPE325c , MPE406 , MPE406
		B.11) **Analyze** results of numerical models and assess their limitations.	BES 003 , BES 003 , MPE322 , MPE423a
		B.12) **Innovate** systematic and methodic approaches when dealing with new and advancing technology.	MPE224 , MPE406 , MPE406
	Power Engineering	B.13) **Evaluate** mechanical power and energy engineering designs, processes and performances and propose improvements.	MPE221 , MPE222 , MPE311 , MPE312 , MPE313 , ELE 319 , MPE314c , MPE321 , MPE324 , MPE325a , MPE412 , MPE414b , MPE414c , MPE421 , MPE423b , MPE424b
		B.14) **Analyze** and interpret data, and design experiments to obtain new data	MPE212 , MPE412 , MPE414a , MPE414b , MPE414c , MPE423b
		B.15) **Evaluate** the power losses in the fluid transmission lines and networks	MPE314a , MPE421
		B.16) **Analyze** the performance of the basic types of internal combustion engines and hydraulic machines	MPE222 , ELE 319 , MPE314c , MPE321 , MPE323 , MPE325a , MPE411 , MPE423c, MPE424c
		B.17) **Analyze** fluid power systems, subsystems and various	MPE314a , MPE414a , MPE421
Professional and P ractical Skills	**Engineering**	C.1) **Apply** knowledge of mathematics, science, information technology, design, business context and engineering practice integrally to solve engineering problems.	BES 011 , BES 012 , BES 003 , PRE 011 , BES 021 , BES 022 , BES 003 , PRE 021 , ELE 021 , MPE111 , PRE 118 , MPE112 , PRE 126 , MPE211 , BES 212 , PRE 218 , MPE221 , MPE312 , MPE314a , PRE327 , MPE406 , MPE422 , MPE406
		C.2) **Compose** the engineering knowledge, understanding, and feedback to improve design, products and/or services.	MPE422 , PRE429 , MPE423b , MPE423c , MPE424c
		C.3) **Create** and/or re-design a process, component or system, and carry out specialized engineering designs.	MPE221 , PRE 228 , MPE406 , MPE406 , MPE424a
		C.4) **Practice** the neatness and aesthetics in design and approach.	MPE101 , MPE101 , PRE 228 , MPE406 , MPE406
		C.5) **Use** computational facilities and techniques, measuring instruments, workshops and laboratory equipment to design experiments, collect, analyze and interpret results.	BES 013 , BES 013 , BES 116 , MPE111 , MPE121 , PRE 129 , MPE211 , MPE212 , PRE 218 , ELE 217 , MPE221 , MPE222 , MPE224 , MPE311 , MPE321 , MPE323 , MPE324 , MPE411 , MPE412 , MPE406 , MPE414a , MPE414b , MPE414c , MPE421 , MPE423a , MPE423b , MPE423c , MPE424b

Intended Learning Outcomes (ILOs) of the programme			Courses that assess in realizing ILOs
		C.6) **Use** a wide range of analytical tools, techniques, equipment, and software packages pertaining to the mechanical power and develop required computer programs.	ELE 021 , ELE 117 , MPE322 , MPE415a , MPE415b , MPE415C
		C.7) **Apply** numerical modeling methods to engineering problems.	ELE 021 , ELE 117 , MPE322 , MPE415a , MPE415b , MPE415C
		C.8) **Apply** safe systems at work and observe the appropriate steps to manage risks.	BES 013 , PRE 011 , PRE 021 , BES 013 , BES000 , PRE 128 , ELE 217 , MPE414b
		C.9) **Demonstrate** basic organizational and project management skills.	PRE429 , MPE406
		C.10) **Apply** quality assurance procedures and follow codes and standards.	PRE429 , MPE406
		C.11) **Exchange** knowledge and skills with engineering community and industry.	PRE 011 , PRE 021 , MPE314a , MPE314b , MPE406 , PRE429 , MPE406
		C.12) **Prepare** and present technical reports.	BES 013 , PRE 001 , BES 014 , BES 004 , BES 013 , PRE 001 , BES 004 ,PRE 129 , MPE222 , MPE311 , MPE312 , MPE313 , MPE321 , MPE324 , MPE414b , MPE414c , MPE421 , MPE406 , MPE423b , MPE423c , MPE424c
	Power Engineering	C.13) **Use** basic workshop equipment safely and appropriately.	ELE 217 , MPE311 , MPE312 , MPE321 , MPE324 , MPE413 , MPE414b , MPE414c , MPE423a , MPE423b , MPE423c
		C.14) **Prepare** engineering drawings, computer graphics and specialized technical reports.	MPE101 , MPE101 , MPE212 , PRE 228 , MPE406 , MPE406 , MPE423a
		C.15) **Write** computer programs pertaining to mechanical power and energy engineering.	MPE221 , MPE222 , MPE223 , MPE224 , MPE311 , MPE314c , MPE321 , MPE322 , MPE324 , MPE325b , MPE325c , MPE412 , MPE414a , MPE414b , MPE414c , MPE424a , MPE424b
		C.16) **Describe** the basic Thermal and fluid processes mathematically and use the computer software for their simulation and analysis	MPE121 , MPE221 , MPE222 , MPE223 , MPE224 , MPE311 , ELE 319 , MPE323 ,MPE411 , MPE414b , MPE414c , MPE415a , MPE415b , MPE415C
		C.17) **Design, operate, repair and maintain** fluid hydraulic power systems for diverse applications	MPE314a , MPE321 , MPE322 , MPE325a , MPE325b , MPE414a , MPE421 , MPE423c , MPE424b
		C.18) **Carry out** preliminary designs of fluid transmission networks, internal combustion and steam engines and solve their operational problems.	MPE121 , MPE221 , MPE314a , MPE314c , MPE321 , MPE325a , MPE414a , MPE423c , MPE424b
		C.19) **Work** in mechanical power and energy operations, maintenance and overhaul.	MPE314a , MPE414a , MPE414b ,. MPE423b , MPE423c

Intended Learning Outcomes (ILOs) of the programme		Courses that assess in realizing ILOs
General and transferable Skills	D.1) **Collaborate** effectively within multidisciplinary team.	BES000 , MPE111 , ELE 117 , MPE112 , MPE211 , ELE 217 , MPE221 , PRE 228 , MPE222 , MPE314a , MPE314c , MPE322 , MPE325a , MPE325b , MPE325c , MPE414a , MPE414b , MPE414c , MPE415a , MPE415b , MPE415C , MPE423a , MPE423c , MPE424a , MPE424b , MPE424c
	D.2) **Work** in stressful environment and within constraints.	MPE101 , MPE101 , MPE325a , MPE325b , MPE325c , MPE414a , MPE423a , MPE423c , MPE424b
	D.3) **Communicate** effectively.	BES 012 , BES 003 , PRE 011 , PRE 001 , BES 004 , BES 022 , BES 003 , PRE 021 , PRE 001 , BES 004 , BES000 , MPE101 , MPE101 , PRE 129 , PRE 218 , MPE312 , MPE324 , PRE327 , MPE325b , MPE325c , MPE406 , MPE422 , PRE429 , MPE406 , MPE423a , MPE423c , MPE424a , MPE424b
	D.4) **Demonstrate** efficient IT capabilities.	ELE 021 , ELE 117 , PRE 218 , MPE221 , MPE311 , MPE312 , MPE321 , MPE322 , MPE406 , MPE415a , MPE415b , MPE415C , MPE422 , MPE406
	D.5) **Lead** and **motivate** individuals.	ELE 117 , MPE312 , MPE406
	D.6) **Manage** tasks, time, and resources effectively.	ELE 021 , MPE212 , MPE223 , MPE406 , PRE429 , MPE406
	D.7) **Search for** information and engage in life-long self learning mechanical power.	MPE121 , MPE221 , PRE 228 , MPE224 , MPE311 , MPE312 , MPE313 , MPE314b , MPE314c , MPE321 , MPE322 , MPE323 , PRE327 , MPE411 , MPE412 , MPE406 , MPE415a , MPE415b , MPE415C , MPE421 , MPE406 , MPE423b , MPE424c
	D.8) **Acquire** entrepreneurial skills.	---
	D.9) **Refer to** relevant literatures.	BES 011 , BES 013 , BES 014 , BES 004 , BES 021 , BES 013 , BES 004 , MPE111 , BES 212 , MPE211 , MPE221 , MPE224 , MPE313 , ELE 319 , MPE323 , MPE324 , MPE411 , MPE412 , MPE413 , MPE406 , MPE421 , MPE406 ,MPE423b

8-TEACHING AND LEARNING METHODS

Intended Learning Outcomes (ILOs) of the programme			Teaching and Learning Methods												
			Lecture	Presentations and Movies	Discussions	Tutorials	Lab Exprements	Problem solving	Brain storming	Projects	Site visits	Reserch and Roprting	Grope Working	Discovering	Simulation and Modelling
Knowledge and Understanding	By the end of the program, student should be able to:														
	Engineering	A.1) **Discuss** Concepts and theories of mathematics and sciences, appropriate to the mechanical power engineering.	X		X	X		X				X	X		
		A.2) **Recognise** Basics of information and communication technology (ICT)	X		X	X		X		X		X			
		A.3) **Classify** Characteristics of engineering materials related to the mechanical power engineering	X			X									
		A.4) **List** Principles of design including elements design, process and/or a system related to mechanical power engineering.	X		X	X		X		X		X			
		A.5) **Recognise** Methodologies of solving engineering problems, data collection and interpretation	X				X	X		X			X		X
		A.6) **Explain** Quality assurance systems, codes of practice and standards, health and safety requirements and environmental issues.	X		X							X			
		A.7) **Underline** business and management principles relevant to engineering.	X									X			
		A.8) Identify Current engineering technologies as related to mechanical power engineering.		X	X				X		X	X		X	
		A.9) Discuss topics related to humanitarian interests and moral issues.	X		X				X			X			
		A.10) Write reports using technical language.	X				X		X			X			
		A.11) Discuss Practice professional ethics and realize impacts of engineering solutions on society and environment	X		X				X						
		A.12) Discuss contemporary engineering topics.	X	X	X				X		X	X			
	Power Engineering	A.13) List fundamentals of thermal and fluid processes	X	X	X	X		X		X	X	X			
		A.14) **Recognise** the working principles of internal combustion, pumps, turbines and compressors, classification, construction design concepts, operation and characteristics	X	X	X	X	X	X		X	X	X			
		A.15)Design and troubleshoot Fluid power systems	X	X	X	X		X		X	X	X			
		A.16)Recognize the constraints that limits mechanical power engineers ability to reach an optimum solution.	X		X	X		X		X					
		A.17) Describe business and management techniques and practices appropriate to mechanical power engineering applications.	X			X		X					X		
		A.18)Discuss mechanical power engineering contemporary issues.	X	X	X				X		X	X			

Intended Learning Outcomes (ILOs) of the programme			Teaching and Learning Methods												
			Lecture	Presentations and Movies	Discussions	Tutorials	Lab Exprements	Problem solving	Brain storming	Projects	Site visits	Reserch and Roprting	Grope Working	Discovering	Simulation and Modelling
		A.19) Define basic theories and principles of some other engineering and mechanical engineering providing support to mechanical power engineering.	X	X	X	X		X		X			X	X	
Intellectual Skills	Engineering	B.1) **Select** appropriate mathematical and computer-based methods for modeling and analyzing problems.	X		X	X	X	X	X	X			X		X
		B.2) **Select** appropriate solutions for engineering problems based on analytical thinking.			X	X		X	X				X		
		B.3) **Arrange** in a creative and innovative way in problem solving and design.			X	X		X	X				X		
		B.4) **Combine**, exchange, and assess different ideas, views, and knowledge from a range of sources.			X				X	X	X	X	X		
		B.5) **Assess** and evaluate the characteristics and performance of components, systems and processes.	X		X	X	X	X	X	X			X		
		B.6) **Investigate** the failure of components, systems, and processes.	X		X	X		X	X	X			X		
		B.7) **Solve** engineering problems, often on the basis of limited and possibly contradicting information.	X		X	X			X	X			X		
		B.8) **Select** and appraise appropriate ICT tools to a variety of engineering problems.	X		X	X		X	X	X			X		
		B.9) **Judge** engineering decisions considering balanced costs, benefits, safety, quality, reliability, and environmental impact.	X		X	X		X		X			X		
		B.10) **Incorporate** economic, societal, environmental and risk management dimensions in design.	X		X				X	X			X		
		B.11) **Analyze** results of numerical models and assess their limitations.	X		X	X		X		X			X		
		B.12) **Innovate** systematic and methodic approaches when dealing with new and advancing technology.			X				X	X	X	X	X		
	Power Engineering	B.13) **Evaluate** mechanical power and energy engineering designs, processes and performances and propose improvements.			X				X	X	X		X		
		B.14) **Analyze** and interpret data, and design experiments to obtain new data			X		X		X	X	X	X	X		
		B.15) **Evaluate** the power losses in the fluid transmission lines and networks	X		X	X	X	X		X					
		B.16) **Analyze** the performance of the basic types of internal combustion engines and hydraulic machines	X		X	X	X	X		X					
		B.17) **Analyze** fluid power systems, subsystems and various control valves and actuators.	X		X	X		X		X			X		
Professional Skills	Engineering	C.1) **Apply** knowledge of mathematics, science, information technology, design, business context and engineering practice integrally to solve engineering problems.	X		X			X		X					
		C.2) **Compose** the engineering knowledge, understanding, and feedback to improve design, products and/or services.			X				X	X			X		

Intended Learning Outcomes (ILOs) of the programme			Teaching and Learning Methods												
			Lecture	Presentations and Movies	Discussions	Tutorials	Lab Exprements	Problem solving	Brain storming	Projects	Site visits	Reserch and Roprting	Grope Working	Discovering	Simulation and Modelling
		C.3) **Create** and/or re-design a process, component or system, and carry out specialized engineering designs.			X				X	X		X	X		
		C.4) **Practice** the neatness and aesthetics in design and approach.			X								X		
		C.5) **Use** computational facilities and techniques, measuring instruments, workshops and laboratory equipment to design experiments, collect, analyze and interpret results.			X		X		X	X			X		
		C.6) **Use** a wide range of analytical tools, techniques, equipment, and software packages pertaining to the mechanical power and develop required computer programs.			X		X		X	X			X		
		C.7) **Apply** numerical modeling methods to engineering problems.	X			X		X		X					
		C.8) **Apply** safe systems at work and observe the appropriate steps to manage risks.	X									X			
		C.9) **Demonstrate** basic organizational and project management skills.	X		X					X			X		
		C.10) **Apply** quality assurance procedures and follow codes and standards.	X			X		X		X					
		C.11) **Exchange** knowledge and skills with engineering community and industry.	X		X								X		
		C.12) **Prepare** and present technical reports.	X									X			
	Power Engineering	C.13) **Use** basic workshop equipment safely and appropriately.	X	X	X		X								
		C.14) **Prepare** engineering drawings, computer graphics and specialized technical reports.	X			X		X		X					
		C.15) **Write** computer programs pertaining to mechanical power and energy engineering.	X			X	X	X		X			X		
		C.16) **Describe** the basic Thermal and fluid processes mathematically and use the computer software for their simulation and analysis	X			X		X		X			X		
		C.17) **Design, operate, repair and maintain** fluid hydraulic power systems for diverse applications	X			X	X			X					
		C.18) **Carry out** preliminary designs of fluid transmission networks, internal combustion and steam engines and solve their operational problems.	X		X	X		X		X			X		
		C.19) **Work** in mechanical power and energy operations, maintenance and overhaul.	X	X	X					X	X	X	X		
General Skills		D.1) **Collaborate** effectively within multidisciplinary team.			X		X			X			X		
		D.2) **Work** in stressful environment and within constraints.	X		X		X	X		X					
		D.3) **Communicate** effectively.	X	X	X	X				X			X		
		D.4) **Demonstrate** efficient IT capabilities.	X		X		X	X		X		X	X		X
		D.5) **Lead** and **motivate** individuals.		X						X			X		
		D.6) **Manage** tasks, time, and resources effectively.		X						X			X		

Intended Learning Outcomes (ILOs) of the programme	Teaching and Learning Methods												
	Lecture	Presentations and Movies	Discussions	Tutorials	Lab Exprements	Problem solving	Brain storming	Projects	Site visits	Reserch and Roprting	Grope Working	Discovering	Simulation and Modelling
D.7) **Search for** information and engage in life-long self learning mechanical power.	X							X		X			
D.8) **Acquire** entrepreneurial skills.	X							X		X		X	
D.9) **Refer to** relevant literatures.	X							X		X			

9-ASSESSMENT METHODS

Intended Learning Outcomes (ILOs) of the program			Assessment methods										
			Written Exam	Oral Exam	Tutorial assessment	Project assessment	Model assessment	Report assesment	Quiz assessment	Presentation assessment	Discussion	Laboratory test	Take Home Exam
By the end of the program, student should be able to:													
Knowledge and Understanding	**Engineering**	A.1) **Discuss** Concepts and theories of mathematics and sciences, appropriate to the mechanical power engineering.	X		X				X				
		A.2) **Recognise** Basics of information and communication technology (ICT)	X		X	X							
		A.3) **Classify** Characteristics of engineering materials related to the mechanical power engineering.	X	X	X			X					
		A.4) **List** Principles of design including elements design, process and/or a system related to specific mechanical power engineering.	X	X		X		X	X				X
		A.5) **Recognise** Methodologies of solving engineering problems, data collection and interpretation	X	X	X	X			X		X	X	
		A.6) **Explain** Quality assurance systems, codes of practice and standards, health and safety requirements and environmental issues.	X					X					
		A.7) **Underline** business and management principles relevant to engineering.	X		X			X					
		A.8) **Identify** Current engineering technologies as related to mechanical power engineering.	X	X		X		X			X		
		A.9) **Discuss** topics related to humanitarian interests and moral issues.	X	X				X			X		
		A.10) **Write** reports using technical language.	X			X		X				X	
		A.11) **Discuss** professional ethics and realize impacts of engineering solutions on society and environment	X								X		
		A.12) **Discuss** contemporary engineering topics.	X			X		X		X			
	Power Engineering	A.13) **List** fundamentals of thermal and fluid processes	X	X	X	X			X				
		A.14) **Recognise the working principles** of internal combustion, pumps, turbines and compressors, classification, construction design concepts, operation and characteristics	X	X	X	X			X			X	
		A.15) **Design and troubleshoot** Fluid power systems	X	X	X	X					X		

		Intended Learning Outcomes (ILOs) of the program	Written Exam	Oral Exam	Tutorial assessment	Project assessment	Model assessment	Report assesment	Quiz assessment	Presentation assessment	Discussion	Laboratory test	Take Home Exam
			Assessment methods										
		A.16) **Recognize** the constraints that limit mechanical power engineers' ability to reach an optimum solution.	X			X		X					
		A.17) **Describe** business and management techniques and practices appropriate to mechanical power engineering applications.	X		X	X			X		X		
		A.18) **Discuss** mechanical power engineering contemporary issues.	X					X		X	X		
		A.19) **Define** basic theories and principles of some other engineering and mechanical engineering Mechanical Power providing support to mechanical power Mechanical Power	X			X	X						
Intellectual Skills	**Engineering**	B.1) **Select** appropriate mathematical and computer-based methods for modeling and analyzing problems.	X		X	X	X					X	
		B.2) **Select** appropriate solutions for engineering problems based on analytical thinking.	X		X				X				
		B.3) **Arrange** in a creative and innovative way in problem solving and design.	X	X		X					X		
		B.4)**Combine**, **exchange, and assess** different ideas, views, and knowledge from a range of sources.	X		X			X			X		
		B.5)**Assess** and evaluate the characteristics and performance of components, systems and processes.	X		X				X			X	
		B.6)**Investigate** the failure of components, systems, and processes.	X		X				X				
		B.7)**Solve** engineering problems, often on the basis of limited and possibly contradicting information.	X			X		X					
		B.8)**Select** and appraise appropriate ICT tools to a variety of engineering problems.	X		X			X					
		B.9)**Judge** engineering decisions considering balanced costs, benefits, safety, quality, reliability, and environmental impact.	X			X		X	X		X		
		B.10) **Incorporate** economic, societal, environmental and risk management dimensions in design.	X			X				X			
		B.11) **Analyze** results of numerical models and assess their limitations.				X	X	X					
		B.12) **Innovate** systematic and methodic approaches when dealing with new and advancing technology.				X				X	X		
	Power Engineering	B13) **Evaluate** mechanical power and energy engineering designs, processes and performances and propose improvements.	X		X	X			X	X			
		B.14) **Analyze** and interpret data, and design experiments to obtain new data	X			X					X	X	
		B.15) **Evaluate** the power losses in the fluid transmission lines and networks	X	X		X						X	
		B.16) **Analyze** the performance of the basic types of internal combustion engines and hydraulic machines	X	X		X					X	X	
		B.17) **Analyze** of fluid power systems, subsystems and various control valves and actuators	X	X	X			X	X				
ion al gin eeri		C.1) **Apply** knowledge of mathematics, science, information technology, design, business context and engineering practice integrally to solve engineering problems.	X		X				X				

Intended Learning Outcomes (ILOs) of the program			Assessment methods										
			Written Exam	Oral Exam	Tutorial assessment	Project assessment	Model assessment	Report assesment	Quiz assessment	Presentation assessment	Discussion	Laboratory test	Take Home Exam
		C.2) **Compose** the engineering knowledge, understanding, and feedback to improve design, products and/or services.	X		X	X	X						
		C.3)**Create** and/or re-design a process, component or system, and carry out specialized engineering designs.	X		X	X		X					
		C.4) **Practice** the neatness and aesthetics in design and approach.	X		X	X			X		X		
		C.5) **Use** computational facilities and techniques, measuring instruments, workshops and laboratory equipment to design experiments, collect, analyze and interpret results.	X		X	X	X					X	
		C.6) **Use** a wide range of analytical tools, techniques, equipment, and software packages pertaining to the mechanical power and develop required computer programs.	X		X		X					X	
		C.7) **Apply** numerical modeling methods to engineering problems.	X		X		X		X				
		C.8) **Apply** safe systems at work and observe the appropriate steps to manage risks.	X	X	X			X					
		C.9) **Demonstrate** basic organizational and project management skills.	X			X					X		X
		C.10) **Apply** quality assurance procedures and follow codes and standards.	X		X	X		X					
		C.11) **Exchange** knowledge and skills with engineering community and industry.	X			X		X		X			X
		C.12) **Prepare** and present technical reports.	X					X		X			
	Power Enginering	C.13) **Use** basic workshop equipment safely and appropriately.	X			X						X	
		C.14) **Prepare** engineering drawings, computer graphics and specialized technical reports.	X		X	X		X	X				
		C.15) **Write** computer programs pertaining to mechanical power and energy engineering.	X			X	X		X			X	
		C.16) **Describe** the basic Thermal and fluid processes mathematically and use the computer software for their simulation and analysis	X			X		X					
		C.17) **Design, operate, repair and maintain** fluid hydraulic power systems for diverse applications	X			X		X				X	
		C.18) **Carry out** preliminary designs of fluid transmission networks, internal combustion and steam engines and solve their operational problems.	X	X		X			X				
		C.19) **Work** in mechanical power and energy operations, maintenance and overhaul.	X			X				X			
General Skills		D.1) **Collaborate** effectively within multidisciplinary team.		X		X		X			X	X	
		D.2) **Work** in stressful environment and within constraints.		X		X		X			X	X	
		D.3) **Communicate** effectively.	X			X		X		X			
		D.4) **Demonstrate** efficient IT capabilities.			X	X		X		X		X	
		D.5) **Lead** and **motivate** individuals.				X		X		X	X		
		D.6) **Manage** tasks, time, and resources effectively.				X		X					
		D.7) **Search for** information and engage in life-long self learning mechanical power.				X		X		X			
		D.8) **Acquire** entrepreneurial skills.				X					X		
		D.9) **Refer to** relevant literatures.				X		X		X			

10-SUBJECT AREA

a. Compulsory Course

Code	Course	Total hours (lectures+tutorials/lab.)	Rate	A	B	C	D	E	F	G
				Humanities and Social Sciences	Mathematics and Basic Sciences	Basic Engineering Sciences	Applied Engineering and Design	Computer Applications and ICT	Projects and Practice	Discretionary (Institution character-identifying) subjects
BES 011	Mathematics (1-A)	6	1 hour	0	1	0	0	0	0	0
			Total	**0**	**6**	**0**	**0**	**0**	0	**0**
			%	**0**	**100**	**0**	**0**	**0**	0	**0**
BES 012	Physics (1-A)	5	1 hour	0	0.6	0.2	0	0	0.2	0
			Total	**0**	**3**	**1**	**0**	**0**	1	**0**
			%	**0**	**60**	**20**	**0**	**0**	20	**0**
BES 003	Mechanics	4	1 hour	0	0. 5	0.5	0	0	**0**	0
			Total	**0**	**2**	**2**	**0**	**0**	**0**	**0**
			%	**0**	**50**	**50**	**0**	**0**	0	**0**
BES 013	Chemistry	4	1 hour	0.2	0.2	0.2	0.2	0	**0.2**	0
			Total	**0.8**	**0.8**	**0.8**	**0.8**	**0**	**0.8**	**0**
			%	**20**	**20**	**20**	**20**	**0**	20	**0**
PRE 011	Production engineering	4	1 hour	0.25	0.25	0	0.25	0	**0.25**	0
			Total	**1**	**1**	**0**	**1**	**0**	**1**	**0**
			%	**25**	**25**	**0**	**25**	**0**	25	**0**
PRE 001	Engineering Drawing and Projection	6	1 hour	0	0.166	0.50	0.166	0	**0.166**	0
			Total	**0**	**1**	**3**	**1**	**0**	**1**	**0**
			%	**0**	**16.66**	**50**	**16.66**	**0**	16.66	**0**
BES 014	History of Eng. Sciences	3	1 hour	1	0	0	0	0	0	0
			Total	**3**	**0**	**0**	**0**	**0**	**0**	**0**
			%	**100**	**0**	**0**	**0**	**0**	**0**	**0**
BES 004	English Language	2	1 hour	1	0	0	0	0	0	0
			Total	**2**	**0**	**0**	**0**	**0**	**0**	**0**
			%	**100**	**0**	**0**	**0**	**0**	**0**	**0**
BES 021	Mathematics (1-B)	6	1 hour	0	1	0	0	0	0	0
			Total	**0**	**6**	**0**	**0**	**0**	**0**	**0**
			%	**0**	**100**	**0**	**0**	**0**	**0**	**0**
BES 022	Physics (1-B)	5	1 hour	0.2	0.6	0	0	0	0.2	0
			Total	**1**	**3**	**0**	**0**	**0**	**1**	**0**
			%	**20**	**60**	**0**	**0**	**0**	**20**	**0**
BES 003	Mechanics	4	1 hour	0	0.5	0.5	0	0	0	0
			Total	**0**	**2**	**2**	**0**	**0**	**0**	**0**
			%	**0**	**50**	**50**	**0**	**0**	**0**	**0**
PRE 001	Engineering Drawing and Projection	6	1 hour	0	0.166	0.5	0.166	0	**0.166**	**0**
			Total	**0**	**1**	**3**	**1**	**0**	**1**	0
			%	**0**	**16.66**	**50**	**16.66**	**0**	16.66	**0**
ELE 021	Computers and Programming	3	1 hour	0.3333	0	0	0	0.333	**0.3333**	**0**
			Total	**1**	**0**	**0**	**0**	**1**	**1**	0
			%	**33.33**	**0**	**0**	**0**	**33.33**	**33.33**	**0**
BES 004	English Language	2	1 hour	1	0	0	0	0	0	**0**
			Total	**2**	**0**	**0**	**0**	**0**	**0**	0
			%	**100**	**0**	**0**	**0**	**0**	**0**	**0**
BES 116	Physics 2	6	1 hour	0.17	0.66	0.17	0	0	0	**0**
			Total	**1**	**4**	**1**	**0**	**0**	**0**	0
			%	**17**	**66**	**17**	**0**	**0**	**0**	0

Code	Course	Total hours (lectures+tutorials/ lab.)	Rate	A	B	C	D	E	F	G
				Humanities and Social Sciences	Mathematics and Basic Sciences	Basic Engineering Sciences	Applied Engineering and Design	Computer Applications and ICT	Projects and Practice	Discretionary (Institution character-identifying) subjects
MPE111	Thermodynamics (1)	7	1 hour	0	0.13	0.57	0.20	0.10	0	0
			Total	**0**	**0.9**	**4**	**1.4**	**0.7**	**0**	**0**
			%	**0**	**13**	**57**	**20**	**10**	**0**	**0**
BES000	Human rights	2	1 hour	1	0	0	0	0	0	0
			Total	**2**	**0**	**0**	**0**	**0**	**0**	**0**
			%	**100**	**0**	**0**	**0**	**0**	**0**	**0**
MPE101	Mechanical drawing	4	1 hour	0	0	0.5	0.3	0.2	0	0
			Total	**0**	**0**	**2**	**1.2**	**0.8**	**0**	**0**
			%	**0**	**0**	**50**	**30**	**20**	**0**	**0**
PRE 118	Applied Mechanics	5	1 hour	0	0.2	0.4	0.3	0	0.1	0
			Total	**0**	**1**	**2**	**1.5**	**0**	**0.5**	**0**
			%	**0**	**20**	**40**	**30**	**0**	**10**	**0**
ELE 117	**Electrical Engineering**	4	1 hour	0	0.15	0.50	0.25	0	0.1	0
			Total	**0**	**0.6**	**2**	**1**	**0**	**0.4**	**0**
			%	**0**	**15**	**50**	**25**	**0**	**10**	**0**
MPE112	**Computer Application(1)**	4	1 hour	0	0	0	0	0.75	0.25	0
			Total	**0**	**0**	**0**	**0**	**3**	**1**	**0**
			%	**0**	**0**	**0**	**0**	**75**	**25**	**0**
MPE121	**Fluid Mechanics (1)**	7	1 hour	0	0.20	0.20	0.33	0.17	0	0.1.
			Total	**0**	**1.4**	**1.4**	**2.3**	**1.2**	**0**	**0.7**
			%	**0**	**20**	**20**	**33**	**17**	**0**	**10**
BES 122	**Mathematics(2)**	6	1 hour	0	1	0	0	0	0	0
			Total	**0**	**6**	**0**	**0**	**0**	**0**	**0**
			%	**0**	**100**	**0**	**0**	**0**	**0**	**0**
PRE 126	**Theory of Machines**	5	1 hour	0	0.2	0.60	0.20	0	0	0
			Total	**0**	**1**	**3**	**1**	**0**	**0**	**0**
			%	0	**20**	**60**	**20**	**0**	**0**	**0**
MPE101	**Mechanical Drawing**	4	1 hour	**0**	0	0.6	0.2	0.1	0.1	0
			Total	0	**0**	**2.4**	**0.8**	**0.4**	**0.4**	**0**
			%	**0**	**0**	**60**	**20**	**10**	**10**	0
PRE 128	**Production Engineering**	4	1 hour	0.25	0	0.50	0	0	0.25	**0**
			Total	**1**	**0**	**2**	**0**	**0**	**1**	**0**
			%	**25**	**0**	**50**	**0**	**0**	**25**	0
PRE 129	**Materials Science**	4	1 hour	0	0.25	0.50	0.25	0	0	**0**
			Total	**0**	**1**	**2**	**1.0**	**0**	**0**	**0**
			%	**0**	**25**	**50**	**25**	**0**	**0**	0
BES 212	**Mathematics (3)**	6	1 hour	0	1	0	0	0	0	**0**
			Total	**0**	**6**	**0**	**0**	**0**	**0**	0
			%	**0**	**100**	**0**	**0**	**0**	**0**	**0**
MPE211	**Thermodynamics (2)**	6	1 hour	0	0.234	0.333	0.333	0	0.1	**0**
			Total	**0**	**1.4**	**2**	**2**	**0**	**0.6**	0
			%	**0**	**23.4**	**33.3**	**33.3**	**0**	**10**	**0**
MPE212	**Mechanical Measurement**	7	1 hour	0.14	0.14	0.20	0.24	0 .14	0.14	0
			Total	**1**	**1**	**1.4**	**1.6**	**1**	1	**0**
			%	**14**	**14**	**20**	**24**	**14**	**14**	**0**
PRE 218	**Mechanical Vibration**	4	1 hour	0	0.2	0.3	0.3	0	**0**	**0.2**
			Total	**0**	**0.8**	**1.2**	**1.2**	**0**	0	0.8
			%	**0**	**20**	**30**	**30**	**0**	**0**	**20**
ELE 217	**Electrical and electronic measurements**	6	1 hour	0.2	0.2	0.3	0.2	0	**0.1**	**0**
			Total	**1.2**	**1.2**	**1.8**	**1.2**	**0**	0.6	0
			%	**20**	**20**	**30**	**20**	**0**	**10**	**0**

Code	Course	Total hours (lectures+tutorials /lab.)	Rate	A	B	C	D	E	F	G
				Humanities and Social Sciences	Mathematics and Basic Sciences	Basic Engineering Sciences	Applied Engineering and Design	Computer Applications and ICT	Projects and Practice	Discretionary (Institution character-identifying) subjects
MPE221	**Fluid Mechanics (2)**	8	1 hour	010	0.10	0.20	0.30	0.05	0.13	0.12
			Total	**0.8**	**0.8**	**1.6**	**2.4**	**0.4**	**1**	**1**
			%	**10**	**10**	**20**	**30**	**5**	**13**	**12**
PRE 228	**Design of machine elements**	6	1 hour	0.2	0	0.5	0.15	0	0.15	0
			Total	1.2	0	3	0.9	0	0.9	0
			%	20	0	50	15	0	15	0
MPE222	**Steam Technology**	7	1 hour	0	0.15	0.25	0.40	0.1	0.1	0
			Total	0	1.05	1.75	2.8	0.7	0.7	0
			%	0	15	25	40	10	10	0
MPE223	**Computer Application (2)**	4	1 hour	0.2	0	0	0	0.80	0.	0
			Total	0.8	0	0	0	3.2	0	0
			%	20	0	0	0	80	0	0
MPE224	**Mechatronics**	5	1 hour	0	0	0.20	0.20	0.30	0	0.3
			Total	0	0	1	1	1.5	0	1.5
			%	0	0	20	20	30	0	30
MPE311	**Gas Dynamic**	7	1 hour	0	0.1	0.20	0.30	0.25	0	015
			Total	0	0.7	1.4	2.1	1.75	0	1.05
			%	0	10	20	30	25	0	15
MPE312	**Heat Transfer**	7	1 hour	0	0.20	0.3	0.10	0.1	0.1	0.20
			Total	0	1.4	2.1	0.7	0.7	0.7	1.4
			%	0	20	30	10	10	10	20
MPE313	**Theory of Combustion**	7	1 hour	0	0.1	0.20	0.3	0.1	0.1	0.2
			Total	0	0.7	1.4	2.1	0.7	0.7	1.4
			%	0	10	20	30	10	10	20
ELE 319	**Electric Power Stations**	4	1 hour	0.2	0.2	0.2	0.3	0.1	0	0
			Total	0.8	0.8	0.8	1.2	0.4	0	0
			%	20	20	20	30	10	0	0
MPE321	**Hydraulic Machines**	6	1 hour	0	0.1	0.2	0.3	0.1	0.1	0.2
			Total	**0**	**0.6**	**1.2**	**1.8**	**0.6**	**0.6**	**1.2**
			%	**0**	**10**	**20**	**30**	**10**	**10**	**20**
MPE322	**Numerical Methods In Mechanical Power Eng**	6	1 hour	0	0.1	0.15	0.15	0.35	0	0.25
			Total	**0**	**0.6**	**0.9**	**0.9**	**2.1**	**0**	**1.5**
			%	**0**	**10**	**15**	**15**	**35**	**0**	**25**
MPE323	**Internal Combustion Engines (1)**	6	1 hour	0	0.1	0.25	0.5	0	0.15	0
			Total	**0**	**0.6**	**1.5**	**3**	**0**	**0.9**	**0**
			%	**0**	**10**	**25**	**50**	**0**	**15**	**0**
MPE324	**Refrigeration and Air Conditioning**	6	1 hour	0.1	0.1	0.2	0.2	0.1	0.1	0.2
			Total	**0.6**	**0.6**	**1.2**	**1.2**	**0.6**	**0.6**	**1.2**
			%	**10**	**10**	**20**	**20**	**10**	**10**	**20**
PRE327	**Eng. economy**	2	1 hour	0.6	0	0.2	0.2	0	0	0
			Total	**1.2**	**0**	**0.4**	**04.**	**0**	**0**	**0**
			%	**60**	**0**	**20**	**20**	**0**	**0**	**0**
MPE411	**Internal Combustion (2)**	6	1 hour	0.1	0.1	0.2	0.4	0	0.1	0.1
			Total	**0.6**	**0.6**	**1.2**	**2.4**	**0**	**0.6**	**0.6**
			%	**10**	**10**	**20**	**40**	**0**	**10**	**10**
MPE412	**Thermal Power Plants**	7	1 hour	0.1	0.1	0.10	0.35	0.1	0.1	0.15
			Total	**0.7**	**0.7**	**0.7**	**2.45**	**0.7**	**0.7**	**1.05**
			%	**10**	**10**	**10**	**35**	**1**	**10**	**15**

Code	Course	Total hours (lectures+tutorials/lab.)	Rate	A	B	C	D	E	F	G
				Humanities and Social Sciences	Mathematics and Basic Sciences	Basic Engineering Sciences	Applied Engineering and Design	Computer Applications and ICT	Projects and Practice	Discretionary (Institution character-identifying) subjects
MPE413	**Steam And Gas Turbines**	6	1 hour	0	0.1	0.10	0.50	0.1	0.1	0.1
			Total	**0**	**0.6**	**0.6**	**3**	**0.6**	**0.6**	**0.6**
			%	**0**	**10**	**10**	**50**	**10**	**10**	**10**
MPE421	**Hydraulic System**	6	1 hour	0	0	0.1	0.55	**0.1**	**0.10**	0.15
			Total	**0**	**0**	**0.6**	**3.3**	0.6	0.6	**0.9**
			%	**0**	**0**	**10**	**55**	**10**	**10**	**15**
MPE422	**Automatic Control**	6	1 hour	0	0.1	0.2	0.5	**0.1**	**0**	0.1
			Total	**0**	**0.6**	**1.2**	**3**	0.6	0	**0.6**
			%	**0**	**10**	**20**	**50**	**10**	**0**	**10**
PRE429	**Planning and Project Management**	3	1 hour	0.5	0.2	0.3	0	**0**	**0**	0
			Total	**1.5**	**0.6**	**0.9**	**0**	0	0	**0**
			%	**50**	**20**	**30**	**0**	**0**	**0**	**0**
MPE406	**Project**	6	1 hour	0.1	0	0	0	**0**	**0.9**	0
			Total	**0.6**	**0**	**0**	**0**	**0**	**5.4**	**0**
			%	**10**	**0**	**0**	**0**	**0**	**90**	**0**

b. Elective Course

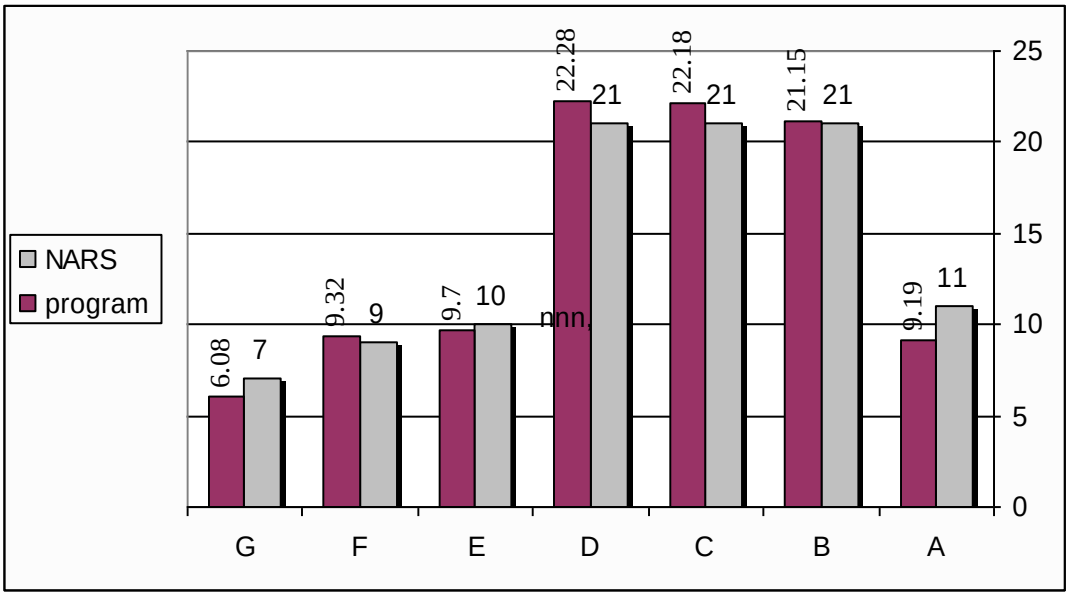
Code	Course	Total hours (lectures+tutorials/lab.)	Rate	A	B	C	D	E	F	G
				Humanities and Social Sciences (Univ. Req.)	Mathematics and Basic Sciences	Basic Engineering Sciences (Faculty/Spec. Req.)	Applied Engineering and Design	Computer Applications and ICT	Projects* and Practice	Discretionary (Institution character-identifying) subjects
MPE314a	**Pipe Network Systems**	5	1 hour	0.2	0	0.2	0.3	0.1	0	0.2
			Total	1	0	1	1.5	0.5	0	1
			%	20	0	20	30	10	0	20
MPE314b	**Renewable Energy And The Environment**	5	1 hour	0.2	0	0	0.3	0.4	0	0.1
			Total	1	0	0	1.5	2	0	0.5
			%	20	0	0	30	40	0	10
MPE314c	**External Combustion System**	5	1 hour	0	0	0	0.3	0.5	0.1	0.1
			Total	0	0	0	1.5	2.5	0.5	0.5
			%	**0**	**0**	**0**	**30**	**50**	**10**	**10**
MPE325a	**Unconventional Pumping machnnes**	4	1 hour	0	0	0.2	0.7	0	0	0.1
			Total	**0**	**0**	**0.8**	**2.8**	**0**	**0**	**0.4**
			%	**0**	**0**	**20**	**70**	**0**	**0**	**10**
MBE325b	**Thermal Energy System**	4	1 hour	0	0	0.2	0.5	0.2	0	0.1
			Total	**0**	**0**	**0.8**	**2**	**0.8**	**0**	**0.4**
			%	**0**	**0**	**20**	**50**	**20**	**0**	**10**
MBE325c	**Air Pollution Produced From Combustion**	4	1 hour	0.3	0	0.2	05	0	0	0
			Total	**1.2**	**0**	**0.8**	**2.0**	**0**	**0**	**0**
			%	**30**	**0**	**20**	**50**	**0**	**0**	**0**
MPE414a	**Control of Hydraulic and Pneumatic Fluids Power**	4	1 hour	0	0	0.10	0.4	0.3	0.10	0.1
			Total	0	0	0.4	1.6	1.2	0.4	0.4
			%	0	0	10	40	30	10	10
MPE414b	**Design and Performance of Refrigeration & A/C Equipment**	4	1 hour	0	0	0	0.50	0.25	0.10	0.15
			Total	0	0	0	2.0	1	0.4	0.6
			%	0	0	0	50	25	10	15
MPE414c	**Design of Internal Combustion Engine Elements**	4	1 hour	0	0	0.1	0.5	0.2	0.10	0.1
			Total	0	0	0.4	2.0	0.8	0.4	0.4
			%	0	0	10	50	20	10	10
MPE415a	**Information Systems in Fluids**	4	1 hour	0	0.1	0.1	0.2	0.5	0	0.1
			Total	**0**	**0.4**	**0.4**	**0.8**	**2**	**0**	**0.4**
			%	**0**	**10**	**10**	**20**	**50**	**0**	**10**
MPE415b	**Information systems in Heat And Energy Systems**	4	1 hour	0	0.1	0.1	0.2	0.5	0	0.1
			Total	**0**	**0.4**	**0.4**	**0.8**	**2**	**0**	**0.4**
			%	**0**	**10**	**10**	**20**	**50**	**0**	**10**
MPE415C	**Information Systems in Internal Combustion Engines**	4	1 hour	0	0.1	0.1	0.2	**0.5**	**0**	0.1
			Total	**0**	**0.4**	**0.4**	**0.8**	2	0	**0.4**
			%	**0**	**10**	**10**	**20**	**50**	**0**	**10**

Code	Course	Total hours (lectures+tutorials/lab.)	Rate	A	B	C	D	E	F	G
				Humanities and Social Sciences (Univ. Req.)	Mathematics and Basic Sciences	Basic Engineering Sciences (Faculty/Spec. Req.)	Applied Engineering and Design	Computer Applications and ICT	Projects* and Practice	Discretionary (Institution character-identifying) subjects
MPE423a	Dynamics of Unsteady Fluid Flow	6	1 hour	0	0	0.2	0.5	0.1	0.1	0.1
			Total	**0**	**0**	**1.2**	**3**	**0.6**	**0.6**	**0.6**
			%	**0**	**10**	**20**	**50**	**10**	**10**	**10**
MPE423b	Design and Operation Thermal Power plants	6	1 hour	0	0	0.10	0.5	0.2	0.1	0.1
			Total	**0**	**0**	**0.6**	**3**	**1.2**	**0.6**	**0.6**
			%	**0**	**0**	**10**	**50**	**20**	**10**	**10**
MPE423c	Maintenance And Operation Of Internal Combustion Engines	6	1 hour	0	0	0.10	0.70	0	0.1	0.1
			Total	**0**	**0**	**0.6**	**4.2**	**0**	**0.6**	**0.6**
			%	**0**	**0**	**10**	**70**	**0**	**10**	**10**
MPE424a	Environmental Engineering	6	1 hour	0.4	0.1	0.15	0.25	0	0.1	0
			Total	**2.4**	**0.6**	**0.9**	**1.5**	**0**	**0.6**	**0**
			%	**0**	**10**	**15**	**45**	**0**	**10**	**0**
MPE424b	Design of Steam and Gas Turbines	6	1 hour	0	0	0.1	0.6	0.1	0.1	0.1
			Total	**0**	**0**	**0.6**	**3.6**	**0.6**	**0.6**	**0.6**
			%	**0**	**0**	**10**	**60**	**10**	**10**	**10**
MPE424c	Fuel systems In internal Combustion Engines	6	1 hour	0	0	0.1	0.6	0.1	0.1	0.1
			Total	**0**	**0**	**0.6**	**3.6**	**0.6**	**0.6**	**0.6**
			%	**0**	**0**	**10**	**60**	**10**	**10**	**10**
Total for compulsory and Elective Courses		301		**27.67**	**63.65**	**66.75**	**67.38**	**29.18**	**28.07**	**18.3**

Table below shows the comparision between the Program and NARS indicative Curriculacon tent by subject area :

Subject Area	NARS Characterization		Program Characterization
	%	Tolerance %	%
A- Humanities and Social Sciences (Univ. Req.)	**11**	**9-12**	**9.19**
B- Mathematic and Basic Sciences	**21**	**20-26**	**21.15**
C- Basic Engineering Sciences (Faculty /spec. Req.)	**21**	**20-23**	**22.18**
D- Applied Engineering and Design	**21**	**20-22**	**22.36**
E- Computer Application and ICT	**10**	**9-11**	**9.70**
F- Projects and Practice	**9**	**8-10**	**9.32**
Subtotal	**93**	**92-94**	**93.92**
G- Discretionary (institution character-identifying) Subjects	**7**	**6-8**	**6.08**
Total	100%	100%	100%

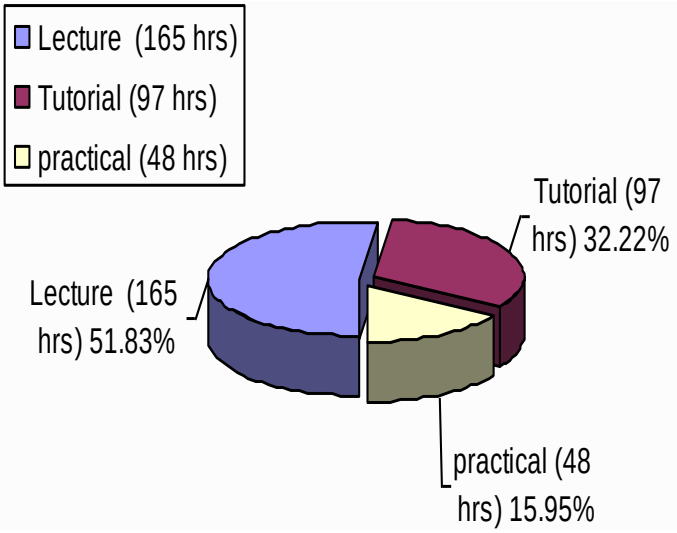
Note : Program characterization% = [total hrs of sabject area /total hr of program] × 100



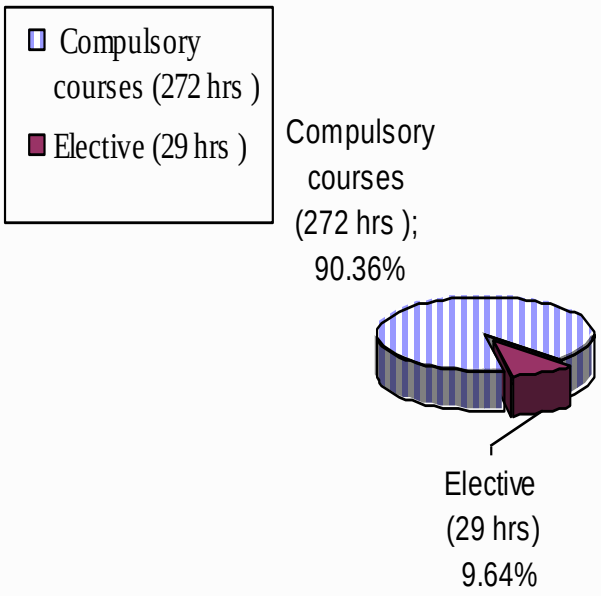
Comparison between the program and NARS indicative curriculacontent by subject area

11-PROGRAM STRUCTURE

Program structure	Program level		Hours / week			Total	Total hrs/week	
	year	Semester	Lecture	Tutorial	Practical	hrs	Compulosry	Elective
	Pre	1st	15	11	4	30	30	0
		2ed	15	10	7	32	32	0
	1st	3ed	14	9	7	30	30	0
		4th	15	11	4	30	30	0
	2ed	5th	16	9	4	29	29	0
		6th	16	8	6	30	30	0
	3rd	7th	17	10	3	30	18	5
		8th	17	9	4	30	19	4
	4th	9th	14	11	5	30	22	8
		10th	17	9	4	30	18	12
Total for prial of system			156 51.831	97 32.221	48 15.95	301 100%	272 90.36	29 9.64



Distribution of total hrs during the priod of the program based on teaching method



Distribution of total hrs in courses bases

12-PROGRAM COURSES

Year of Program: 1st Semester: 1

a. Compulsory

Code No.	Course	hours/week			
		Lec.	Tutorial	Lab	Total
BES 011	Mathematics (1-A)	4	2	-	6
BES 012	Physics (1-A)	3	-	2	5
BES 003	Mechanics	2	2	-	4
BES 013 PRE 011	Chemistry / Production Engineering	2	-	2	4
PRE 001	Engineering Drawing & Projection	2	4	-	6
BES 014	History of Eng- Sciences	2	1	-	3
BES 004	English Language .	-	2	-	2

Year of Program: 1st Semester: 2

a. Compulsory

Code No.	Course	hours/week			
		Lec.	Tutorial	Lab	Total
BES 021	Mathematics (1-B)	4	2	-	6
BES 022	Physics (1-B)	3	-	2	5
BES 003	Mechanics	2	2	-	4
PRE 011 BES 013	Production Engineering / Chemistry	2	-	2	4
PRE 001	Engineering Drawing & Projection	2	4	-	6
ELE 021	Computer and Programming	2	-	1	3
BES 004	English Language	-	2	-	2
BES000	Human Rights	2	-	-	2

Year of Program: 2nd Semester: 1

a. Compulsory

Code No.	Course	hours/week			
		Lec.	Tutorial	Lab	Total
BES 116	Physics (2)	2	2	2	6
MPE 111	Thermodynamics (1)	4	2	1	7
MPE 101	Mechanical Drawing	1	3	-	4
PRE 118	Applied Mechanics	3	1	1	5
ELE 117	Electrical Eng.	2	1	1	4
MPE 112	Computer Applications(1)	2	-	2	4

Year of Program: 2nd Semester: 2

a. Compulsory

Code No.	Course	hours/week			
		Lec.	Tutorial	Lab	Total
MPE 121	Fluid Mechanics (1)	4	2	1	7
BES 122	Mathematics (2)	4	2	-	6
PRE 126	Theory of Machines	3	2	-	5
MPE 101	Mechanical Drawing	-	4	-	4
PRE 128	Production Eng.	2	-	2	4
PRE 129	Material Science	2	1	1	4

Year of Program: 3rd Semester: 1

a. Compulsory

Code No.	Course	hours/week			
		Lec.	Tutorial	Lab	Total
BES 212	Mathematics (3)	4	2	-	6
MPE 211	Thermodynamics (2)	3	2	1	6
MPE 212	Mechanical Measurements	4	2	1	7
PRE 218	Mechanical Vibrations	2	1	1	4
ELE 217	Electrical Measurements and Electronics	3	2	1	6

Year of Program: 3rd Semester: 2

a. Compulsory

Code No.	Course	hours/week			
		Lec.	Tutorial	Lab	Total
MPE 221	Fluid Mechanics (2)	4	2	2	8
PER 228	Design of Machine Elements	3	3	-	6
MPE222	Steam Technology	4	2	1	7
MPE 223	Computer Applications (2)	2	-	2	4
MPE 224	Mechtronics	3	1	1	5

Year of Program: 4th Semester: 1

a. Compulsory

Code No.	Course	hours/week			
		Lec.	Tutorial	Lab	Total
MPE 311	Gas Dynamics	4	2	1	7
MPE 312	Heat Transfer	4	2	1	7
MPE 313	Theory Of Combustion	4	2	1	7
ELE 319	Electrical Power Stations	2	2	-	4

b- Elective

Code No.	Course	hours/week			
		Lec.	Tutorial	Lab	Total
MPE314A	Pipe Network Systems	3	2	-	5
MPE314B	Renewable Energy and Environment	3	2	-	5
MPE314C	External Combustion Systems	3	2	-	5

Year of Program: 4th Semester: 2

a. Compulsory

Code No.	Course	hours/week			
		Lec.	Tutorial	Lab	Total
MPE 321	Hydraulic Machines	3	2	1	6
MPE 322	Numerical Methods in Mech. Power Eng.	3	2	1	6
MPE 323	Internal Combustion Engines (1)	3	2	1	6
MPE 324	Refrigeration and Air Conditioning	3	2	1	6
PRE 327	Engineering Economy	2	-	-	2

b- Elective

Code No.	Course	hours/week			
		Lec.	Tutorial	Lab	Total
MPE325A	Unconventional Pumping Machines	3	1	-	4
MPE325B	Thermal Energy Systems	3	1	-	4
MPE325C	Air Pollution Produced from Combustion	3	1	-	4

Year of Program: 5th Semester: 1

a. Compulsory

Code No.	Course	hours/week			
		Lec.	Tutorial	Lab	Total
MPE 411	Internal Combustion engines (2)	3	2	1	6
MPE 412	Thermal Power Plants	4	2	1	7
MPE 413	Steam and Gas Turbines	3	2	1	6
MPE 406	Project	-	3	-	3

b- Elective

Code No.	Course	hours/week			
		Lec.	Tutorial	Lab	Total
MPE 414A	Control of Hydraulic and Pneumatic Fluids Power	2	1	1	4
MPE 414B	Design and Performance of Refrigeration and Air Conditioning Equipment	2	1	1	4
MPE414C	Design of Internal Combustion Engine Elements	2	1	1	4
MPE 415A	Information Systems in Fluids	2	1	1	4
MPE 415B	Information Systems in Energy and Heat	2	1	1	4
MPE415C	Information Systems in Internal Combustion Engines	2	1	1	4

Year of Program: 5th Semester: 2

a. Compulsory

Code No.	Course	hours/week			
		Lec.	Tutorial	Lab	Total
MPE 421	Hydraulic Systems	4	1	1	6
MPE 422	Automatic Control	4	1	1	6
PRE 429	Projects Planning and Management	3	-	-	3
MPE 406	Project	-	3	-	3

b- Elective

Code No.	Course	hours/week			
		Lec.	Tutorial	Lab	Total
MPE 423A	Dynamics of Unsteady Fluids Flow	3	2	1	6
MPE 423B	Design and Operation of Thermal Power Plants	3	2	1	6
MPE423C	Maintenance and Operation of Internal Combustion Engines	3	2	1	6
MPE 424A	Environmental Engineering	3	2	1	6
MPE 424B	Design of Steam and Gas Turbine	3	2	1	6
MPE424C	Fuel Systems in Internal Combustion Engines	3	2	1	6

13- Courses Specification

The detailed program courses specifications are given in Appendix 1. These courses specifications were revised and approved on October, 2012. The contribution of each course to the program ILO's were considered during this revision.

14- Program Mapping

The contribution of the individual courses to the program ILO's marked in the courses specifications and revised following the evaluation of the mapping matrix. Therefore, the courses specifications are approved by the department scientific council following the program specification approval.

Appendix 2 shows the Program Mapping matrix, developed on the basis of the courses specifications. The mapping matrix shows that the program courses present balanced contribution to the program ILO's.

15-COURSES CONTENT

BES 011 : Mathematics (1-A)	Lecture	Tutorial	Lab	total
	4	2	-	6

Functions and and Elementary Functions , Limits and Continuity . Derivatives and partial derivative , Application of derivative , Polar, Cylindrical, and spherical coordinate in vector space , Equation of second degree General equation of conic section- properties of conic section (Parabola – ellipse – hyperbola) Transformation and rotation of axes , Equation of two lines – equation of sphere and surface of revolution Equation of planes and straight lines in space

BES 012 : Physics (1-A)	Lecture	Tutorial	Lab	total
	3	-	2	5

Units and Dimensions - Gravitation, Newton's law, kepler's law, gravitational force, field and potentental -Elastic properties of solid, Hook's law, elasticity modulus and its types - Fluid mechanics, pressure, fluid statics, Fluid dynamics, Bernoulli's equitation and its a application -Temperature; Thermometers, Zero law of thermodynamics, Thermal expansion -Heat and first law of thermodynamics and its application -Kinetic theory of gases -Heat engines, Entropy and second law of thermodynamics -Geometrical optics, reflection and refraction, image formation .

BES 003 Engineering Mechanics	Lecture	Tutorial	Lab	total
	2	-	2	4

Introduction to statics, Mechanics, the subject and axioms of statics, Newton's three laws of motion, Newton's law of gravitational attraction, moment of force about a point O, replacement of a force by a force and couple.- Force Vector, Force resultant in two dimensions, scalar and vectors, types of vectors, operations on vectors -Parallelogram law, addition of rectangular force components, the dot and cross product, some examples of dot product and examples of the cross product (moment of force) - Force resultant in three dimensions, (converging and non-converging forces) Plane system of converging forces, The composition of two forces applied at a single point, the projection of a geometric sum of vectors on an axis - An analytical method for determination of a resultant of a plane system of converging forces and graphical methods (polygon of forces). Conditions of equilibrium of a plane system of converging forces, a theorem on the equilibrium of three non parallel forces lying in one plane - Plane system of non-converging forces, the composition of two parallel forces acting in the same direction, the composition of two forces unequal in magnitude and acting in opposite direction - Non-concurrent coplanar forces, methods for determining the resultant, analytical methods and graphical method (Funicular or string polygon), conditions for equilibrium for system of non converging forces - Plane trusses, simple truss, stresses, Bow's notation, support reactions and free body diagram, zero force members, methods for solving the trusses - Analytical method of isolated joints. Methods of sections - Cantilever truss and graphical methods -Frames and machines, applications for equations of equilibrium. - Friction, types of friction, the laws of sliding friction and the laws of rolling friction.- Introduction to dynamics, Background, basic concepts, Newton's laws, engineering and mechanics, and methods for solving problems. - Kinematics of particles, 1. rectilinear motion, basic concepts such as position, velocity, and acceleration, distance ,

displacement and speed - Determination of the motion of the particle.- Graphical solution of rectilinear motion -Curvilinear motion, Basic concepts, position vector, velocity and acceleration. Rectangular components of the velocity and acceleration - Application on the rectangular components of velocity and acceleration, Projectiles. - Tangential and normal components, radial and transverse components of the velocity and acceleration, cylindrical and spherical coordinates. - Motion of several particles, dependent motion and relative motion of two particles - Kinematics of particles, Newton's second law of motion, Linear momentum of a particle, systems of units, and equations of motion in rectangular coordinates including friction force -Newton's second law of motion in tangential and normal components and radial and transverse components. - Work of a force, work exerted by constant force, weight force, spring force, and principle of work and energy. Power and efficiency - Oblique central impact

BES 013 Chemistry	Lecture	Tutorial	Lab	total
	2	-	2	4

The Gaseous State - Mass and heat balance in Fuel Combustion - Electrochemistry & Corrosion . - Properties of Solutions & Alloys . - Treatment of Water .- Air Pollution - Dynamic Equilibrium in Physical & Chemical Processes .- Building materials- Petrochemicals .- Polymers .

PRE 011 Production Technology	Lecture	Tutorial	Lab	total
	2	-	2	4

workshop safety - Fundamentals of Engineering Materials - Casting processes-Forming processes (Rolling – Drawing ,Extrusion , Spinning) - Welding processes - Bench work (Measurement , Filling ,Taping , Drilling , Sawing) - Metal Machining - principles (Turning – Milling – Shaping – Drilling – Grinding)

PRE 001 Engineering Drawing & Projection	Lecture	Tutorial	Lab	total
	2	4	-	6

Drawing Instruments - Geometric constructions - Introduction of Engineering drawing - Geometrical constructions -Orthographic projections of Eng. Bodies Isometric of bodies- Mechanical joints - Construction of Isometric from projection - Assembly drawing and sectional projection - Projection of point, lines and planes - Steel structure are joints - Orthographic or Multi-view projection -Isometric projection - Drawing the sections in parts - Drawing steel sections

BES 014 History of Engineering. Sciences	Lecture	Tutorial	Lab	total
	2	1	-	3

Identification of Arts, Sciences, Technology and Engineering - Civilization development and their relation with natural and human sciences- History of Technology in different aspects- Historical relation between science and technology- The relation between engineering development and Environmental development. (Social aspects of civilization) examples of development in different engineering activities

BES 004 English Language	Lecture	Tutorial	Lab	total
	-	2	-	2

Introduction to Scientific Statements - Be and have in scientific statements - Statements requiring the Present Simple - Exercises - Dimensions and Properties - Dimensions - Properties - 'Fronted' statements Qualified Statements of Dimensions - Exercises - Comparisons and Modals -imple statements of comparison - Qualified comparative statements - A note on modals in scientific English - Impersonal Scientific Statements - The Passive Form of the passive - -Use of the passive - By and the agent - Must, should, and the passive - Passives and infinitives - Passive and active Technical Readings - Four different Engineering topics

BES 021 Engineering Mathematics(1-b)	Lecture	Tutorial	Lab	total
	4	2	-	6

Indefinite Integral . - Definite Integral - Application of Integration . - Numerical method of integration .- Polar, Cylindrical, and spherical coordinate in vector space - Equation of second degree General equation of conic section-properties of conic section (Parabola – ellipse – hyperbola)- Transformation and rotation of axes Equation of two lines – equation of sphere and - surface of revolution

BES 022 Physics (1-B)	Lecture	Tutorial	Lab	total
	3	-	2	5

Modern physics; Blackbody radiation, photoelectric effect, binding in solids, band theory of solid, energy band .- Electric field; electric charge, coulomb's law, electric field . - Gauss law; electric flux, Gauss's law and its application - Electric potential; for point charge, charged body .- Capacitance and dielectric, definition and its calculating .- Current and Resistance; Variation of resistivity . Magnetic field and sources; Magnetic forces, Biot – Sarant law Ampere's law, magnetic flux, Gauss's law of magnetism. - Farady's law, induction, induced emf, generators and motors . - Magnetism and matter, Dia , Para -, and Ferromagnetic materials

PRE 021 Production Engineering	Lecture	Tutorial	Lab	total
	2	-	2	4

workshop safety - Fundamentals of Engineering Materials - Casting processes-Forming processes (Rolling – Drawing ,Extrusion , Spinning) - Welding processes - Bench work (Measurement , Filling ,Taping , Drilling , Sawing) - Metal Machining - principles (Turning – Milling – Shaping – Drilling – Grinding)

BES 023 Chemistry	Lecture	Tutorial	Lab	total
	2	-	2	4

The Gaseous State - Mass and heat balance in Fuel Combustion - Electrochemistry & Corrosion . - Properties of Solutions & Alloys . - Treatment of Water .- Air Pollution - Dynamic Equilibrium in Physical & Chemical Processes .- Building materials - Petrochemicals .- Polymers .

ELE 021 Computers and programming	Lecture	Tutorial	Lab	total
	2	-	1	3

Introduction - Types of coputer and their features-classification of computers –computer generation-historical development of computers. - COMPUTER HARDWARE -

Hardware components – CPU – input devices(key board, mouse, ..etc) – output devices(Printer, scanner,. .etc) - Ports- units of measuring computer size - COMPUTER SOFTWARE - Classification of software- Operating systems- Application software0 Software generation. – DOS - Basic differences between command line interface and GUI – DOS commands – Error messages. - NUMBERING SYSTEMS - Basic features- Decimal NS – Binary N.S- Octal N.S. – Hexadecimal N. S. – Transformation between different numbering systems – direct transformation between binary and hexadecimal systems. ALGORITHMS AND FLOW CHARTS - Development of algorithms- How problems can be solved- examples - PROGRAMMING - Introduction to programming – Input output statements- Examples – Applications .

BES 022 Physics (2)	Lecture	Tutorial	Lab	total
	2	2	2	6

Modern physics; Blackbody radiation, photoelectric effect, binding in solids, band theory of solid, energy band .- Electric field; electric charge, coulomb's law, electric field . - Gauss law; electric flux, Gauss's law and its application - Electric potential; for point charge, charged body .- Capacitance and dielectric, definition and its calculating .- Current and Resistance; Variation of resistivity . Magnetic field and sources; Magnetic forces, Biot – Sarant law Ampere's law, magnetic flux, Gauss's law of magnetism. - Farady's law, induction, induced emf, generators and motors . - Magnetism and matter, Dia , Para -, and Ferromagnetic materials

MPE 111 Thermodynamics (1)	Lecture	Tutorial	Lab	Total
	4	2	1	7

Introduction – Definitions - Properties of substances – Types of energies - Heat and work – first Law of Thermodynamics and its applications – Second Law of thermodynamics – Entropy and irreversibility – Ideal Gas processes - Air standard cycles

MPE 101 Mechanical Drawing	The term	Lecture	Tutorial	Lab	Total
	First semester	1	3	-	4
	Second semester	-	4	-	4

Types of engineering drawings (construction and assembly) – Types of orthographic projection (First angle – Third angle) – Representation of joints (nuts , bolts , studs , screw threads , keys , cotter joints , springs locking devices) - Machining marks , tolerances and fits) – Examples on assembly drawing – Heat engine parts : bearings , valves , pumps parts , pulleys , shaft couplings .

PRE 118 Applied Mechanics	Lecture	Tutorial	Lab	Total
	3	1	1	5

Introduction to theory of structures - Beams with -various types (Reactions-Normal Force-Shearing force-Bending moment) - Simple frames – Equations of motion- Work done – Energy, Impulse - Dynamics of particles, Impact- Dynamics of rigid bodies - Dynamics of systems with a single degree of freedom

ELE 117 Electrical Engineering	Lecture	Tutorial	Lab	Total
	2	1	1	4

D.C. Circuit: **Circuit variables - system of units - basic circuit elements. -Ohm's law - power and energy - voltage and current sources - circuit captaining a dependent source -Techniques of circuit analysis: Kirchoff's laws - the node - Super position. Voltage method - Thevenin theorems maximum power transfer-Delta/star and star/delta trans formation -*A.C. Circuits:* The Inductance and capacitance-Series-parallel combinations of inductance and capacitance - Series and parallel resonance- Sinusoidal steady state analysis, single-phase ciruits- Balanced three phase circuits - measurement of average power in thee-phase circuits-*Magnetic Circuits:* magnetic circuit elements,**

B.H curve, characteristics of magnetic materials, amper-turns, reluctance, flux D.C excited electromagnetic devices

MPE 112 Computer Application	Lecture	Tutorial	Lab	Total
	2	-	2	4

This course aims at acquiring experience in writing computer programs to solve Arithmetic & Logical problems in the field of mechanical engineering - Constants and variables – Mathematical Expressions – Input and output commands – Conditional and unconditional transfer – Looping commands – Applied Examples

MPE 121 Fluid Mechanics (1)	Lecture	Tutorial	Lab	Total
	4	2	1	7

Definitions , physical properties of fluids – Liquid pressure measurements – Characteristics of liquid pressure , relative balance of liquid pressure – Hydrostatic pressure on submerged surfaces – Centre of pressure – Forces on curved surfaces – Buoyancy – Kinematics of fluid flow :– Definitions – Derivation of continuity equation for one and three dimensional flow - Dynamics of fluid flow , derivation of Bernoulli's equation - Application - Fluid flow measurements in pipes channels tanks and river - Real fluid flow in pips and applications the Momentum theorem of fluid flow – Derivation of momentum equation and applications .

BES 122 Mathematics (2)	Lecture	Tutorial	Lab	Total
	4	2	-	6

Ordinary differential equations. -Laplace transform -Multiple integrals-Partial derivatives-Fourier analysis-Infinite series and sequences.-Integration on curved surfaces.

PRE 126 Theory of Machines	Lecture	Tutorial	Lab	Total
	3	2	-	5

Kinematics and dynamic analysis of mechanisms and machines - Velocity and acceleration with various methods - Gears and Gear boxes – Cams - Analysis of force on mechanisms – Flywheels

PRE 128 Production Engineering	Lecture	Tutorial	Lab	Total
	2	-	2	4

Machining processes: Cutting tool materials-Cutting fluid - Turning – Milling Shaping – Drilling – Grinding - Introduction to forming: Forging - Rolling – Extrusion - Deep drawing - Blanking and piercing

PRE 129 Materials Science	Lecture	Tutorial	Lab	Total
	2	1	1	4

Properties of mechanical materials (tests for tension-compression-shear-hardness) .- Simple stress and strain Solidification of metals and mechanics of plasticity- Annealing - Hot forming - Metallographic examination and casting diagrams - Heat treatment for steel and alloys - Non-ferrous metals and their alloys - Chemical wear and its treatment

BES 212 Mathematics (3)	Lecture	Tutorial	Lab	Total
	4	2	-	6

Vector algebra -Vector differentiation-line and multiple integral-Green's theorem-Surface and surface integral-Stock's theorem- Linear programming -Special function-Solution of ordinary differential equations using power series.

MPE 211 Thermodynamics (2)	Lecture	Tutorial	Lab	Total
	3	2	1	6

Phase equilibrium – Phase change of substances – Steam and water charts – Entropy generation and irreversibility – Power and refrigeration cycles – Ideal gas mixtures – Properties of moist air and psychometric – Chemical equilibrium and combustion – Heat of combustion – Real gases .

MPE 212 Mechanical Measurement	Lecture	Tutorial	Lab	Total
	4	2	2	8

Basic concepts in measurement and measurement standard values . Experimental planning and report writing . Theory and methods of experimental data analysis . Theory and method of : - static and dynamic pressure measurements in different media , flow rate measurements in different media - Temperature measurements , fluid level and forces . Optical instrument for flow rate measurement . Measurement instrument for the rate of pollution .

PRE 218 Mechanical Vibration	Lecture	Tutorial	Lab	Total
	2	1	1	4

Vibration of system with single degree of freedom - Vibration of systems with multi-degrees of freedom - Vibration of continuous systems - Approximate methods for finding natural frequencies and modes

ELE 217 Electrical and Electronic Measurements	Lecture	Tutorial	Lab	Total
	3	2	1	6

Direct current circuits , potential difference , effect of temperature on resistance , Ohm's law , resistance in series , resistance in parallel, work, power and energy , joule's law , temperature effect of current . - Kirchhoffg's laws , current and voltage sources , Thevenin's theorem , Norton's theorem , superposition theorem - Millman's theorem, maximum power transfer theorem, delta – star transformation, mesh and node equations. Magnetic circuit, definitions concerning magnetic circuit, composite magnetic circuit, comparison between magnetic and electric circuit, magnetization curves. - Inductance, Faraday's law of electromagnetic induction , Lenz's law , dynamically induced emf , statically induced emf. - Inductance in series and parallel, mutual inductance, coefficient of coupling, coupled coils in series. Solved Examples. - Current rise in an inductor, R-L time constant, current fall in an inductor. Solved Examples. Alternating current fundamentals, generation of ac, average value, RMS value, phasor representation of sinusoidal waveform, phasor diagram, mathematical representation of phasor. - AC through resistance only, AC through inductance only , AC through capacitance only. - Alternating current through R-L , R-C , and R-L-C circuits. - Series and parallel ac circuits, ac through R-L , ac through R-C , ac through R-L-C in series , series resonance. - Parallel ac circuits, parallel resonance, power factor improvement. - Three – phase circuits, generation of three phase voltage, symmetrical star and delta connection system, power imbalanced three phase systems, power factor improvement, delta star transformation.

MPE 221 Fluid Mechanics (2)	Lecture	Tutorial	Lab	Total
	4	2	2	8

Differential analysis of flow : continuity equation , / Navier - Stokes equations , Application and solutions of Navier – Stokes equation for viscous incompressible flow – Introduction to turbulent flow - Incompressible inviscid flow : Two- dimensional irrotational flow , vorticity and circulation , stream function , velocity potentials , Basic flow fields , combining flows by superposition – Pressure distribution around constant and rotated cylinder immersed in a flow – Pressure distribution around air foils – Boundary layer : fundamental concepts , Differential equations for the Boundary layer , Laminar boundary layers , Exact solution of the steady state Boundary layer equations , Turbulent boundary layers , Approximate methods for the solution , Drag and friction forces on flat plate due to boundary layer -Separation of boundary layers , External viscous incompressible flow : Drag and lift forces – Pressure distribution around foils and bodies .

PRE 228 Design of Machine Elements	Lecture	Tutorial	Lab	Total
	3	3	-	6

Introduction machine element design – Stresses – Deflections - Design of fixed joints (keys, welds, etc...) Design of power transmission Elements (belts, chains, gears,) - Springs design

MPE 222 Steam Technology	Lecture	Tutorial	Lab	Total
	2	-	2	6

Steam generation processes - Steam cycles - Steam flow through nozzles - Steam condensers - Heat transfer in boiling liquids .

MPE 223 Computer Application (2)	Lecture	Tutorial	Lab	Total
	2	-	2	4

This course aims at acquiring experience in developing programs for mechanical engineering applications that handle tables , matrices , and data file manipulation . Subscripted variables (one and two dimensional) – Functions (Built– in and User defined) – Subroutines – File manipulations (Sequential and Random data files) – Applied examples

MPE 224 Mechatronics	Lecture	Tutorial	Lab	Total
	3	1	1	5

Philosophy of the integration of mechanical , electronic and computer engineering – The important role of the electronics in mechanical power engineering – Principles of the mechatronic systems – Performance of the mechatronic systems – Computer usage in control – Interfaces – I/O for compilers – Data acquisition systems – Fluid level control – Robotic applications

MPE 311 Gas Dynamic	Lecture	Tutorial	Lab	Total
	4	2	1	7

Basics and principles of compressible steady One- Dimensional Flow of gas dynamics – Compressible flow through ducts [Isentropic flow in nozzle and diffuesr – Frictional flow inside constant cross- Sectional area ducts – Frictionless flow inside a constant area duct with heat transfer) - Waves in supersonic flow (Normal shock wave – Oblique shock wave – Expansion waves … etc) Applications on lifting foils -Characterisic method for solving 2-D isentropic compressible flow .

MPE 312 Heat Transfer	Lecture	Tutorial	Lab	Total
	4	2	1	7

General heat conduction equation – One-dimensional steady state heat conduction – Two-dimensional steady state heat conduction – Transient heat conduction – Heat transfer by convection and basic concepts of thermal boundary layer - Natural and forced convection for internal and external flow – Heat transfer by boiling and condensation – Analysis of heat exchangers and design – Radiation heat transfer – Calculations of heat and mass transfer .

MPE 313 Theory of Combustion	Lecture	Tutorial	Lab	Total
	4	2	1	7

Principles of combustion – Combustion thermodynamics – Chemistry of combustion - Conservation of mass, momentum and energy for multi - Component reactive systems – Types of combustion waves – Laminar premixed flames – Laminar diffusion flames

MPE 314 A Pipe Network Systems	Lecture	Tutorial	Lab	Total
	3	2	-	5

The course of pipe network systems is designed to give students information about the analysis of flow characteristics and calculation of energy losses in pipelines . This course covers the subjects essential to understand the analysis and design of pipe network systems in cases of steady and unsteady flows . It covers the maintenance and economic evaluation of pipe breaks .

MPE 314 B	Renewable Energy And The Environment	Lecture	Tutorial	Lab	Total
		3	2	-	5

Solar Energy Direct and Indirect methods of utilization of solar energy – Calculation of radiation intensity of Earth surface – Measurement of solar radiation – Transmission of radiation through glazing – Methods of collecting solar energy – Energy storage – Applications of solar conversion systems

Wind Energy Introduction to energy sources and wind energy - Properties of wind – Measurement of wind speed and direction – Types of wind machines – Energy contents in wind – Solar chimney with collectors - Economics of wind energy – Techniques of wind energy storage . Thermal pollution – Effects on environment – Controlling thermal pollution – Suitable energy for remote areas

MPE 314 C	External Combustion System	Lecture	Tutorial	Lab	Total
		3	2	-	5

Types and selection of boilers – Maintenance and operation of boilers – Design of boiler parts – Boilers performance – Type of industrial furnaces – Furnaces performance – Design of furnaces parts – Design of gas turbine power stations – Combustion chambers of gas turbines and their performance – Combustion control – Enhancing combustion efficiency .

MPE 321	Hydraulic Machines	Lecture	Tutorial	Lab	Total
		3	2	1	6

Definition of the interchange work done in hydraulic machines – Power – Efficiency – Similarity – Centrifugal pumps : – Theory , The mean parts , Construction of the pump – Cavitations , The pump performance in a hydraulic system , Pump installations (series and parallel) , Pump performance at different speeds , The mean dimension the pump , Axial flow pumps:– theory , The main parts , pump performance , Hydraulic turbines : Introduction and classification – Performance – Power control in Hydraulic turbines .

MPE 322	Numerical Methods In Mechanical Power Eng.	Lecture	Tutorial	Lab	Total
		3	2	1	6

Philosophy of using numerical methods – categories of differential equations – Uniform and non-uniform numerical net – Numerical solutions of first order ordinary differential equations as initial-value problems - Numerical solutions of ODE as Boundary value problems . – PDE Solutions – PHYSICAL to numerical net transfer.

MPE 323	Internal Combustion Engines (1)	Lecture	Tutorial	Lab	Total
		3	2	1	6

Engine classifications and their parts – Engine thermal cycles - Spark ignition engines (combustion process, combustion chambers, fuel feeding systems) – Compression . Ignition engines (combustion process, combustion chambers, fuel systems) – Supercharging and scavenging engines .

MPE 324	Refrigeration and Air Conditioning	Lecture	Tutorial	Lab	Total
		3	2	1	6

Refrigeration methods – Simple and compound vapour compression - Refrigeration systems – Refrigerants and selection of suitable refrigerant – Absorption refrigerant

systems . Refrigerant load calculation : of a cold store of defrosting . Summer , winter and All year conditioning cycles – Load calculation – Components of central air conditioning systems [Induction unit – Fan coil unit – Air Handling unit] – Air Duct Design.

PRE 327 Engineering Economy	Lecture	Tutorial	Lab	Total
	2	-	-	2

Cash flow – Discounted cash flow-Comparison of alternatives - Break- even analysis - Depreciation methods - Decision making - Replacement analysis

MPE 325 A Unconventional Pumps	Lecture	Tutorial	Lab	Total
	3	1	-	4

Reciprocating pumps : Types , Work , Discharge – Power , and Air vessels – Gear pumps : Types , Performance , Characteristics , and its usage - Diaphragm pumps and water hammer pumps : parts , theory of operation , pump performance and efficiency , its usage – Jet pumps : theory of operation and performance and its usage- Air lift pump : theory of operation and performance .

MPE 325 B Thermal Energy System	Lecture	Tutorial	Lab	Total
	3	1	-	4

Definitions – Availability - Energy – Lost of Energy : Heat engine cycles , Refrigeration cycles , Heat pump cycles , Non flow process , steady flow process , mechanisms of entropy generation and energy destruction , Heat transfer across a finite temperature difference , Flow with friction , Mixing processes – Generalized energy analysis : Power generation , External and internal irreversibility , Advanced steam turbine power plants , Advanced gas turbine power plants , Chemical reactive systems , Single phase systems , Multi- phase systems .

MPE 325 C Air Pollution Produced From Combustion	Lecture	Tutorial	Lab	Total
	3	1	-	4

Introduction to environmental pollution – Types of pollutants and their environmental effect – Factors affecting pollutants concentration from internal combustion engines – Factors affecting pollutants concentration in boilers and furnaces – Methods used to control pollutants concentration – Measuring instruments – Mechanisms of pollutants formation .

MPE 411 Internal Combustion	Lecture	Tutorial	Lab	Total
	3	2	1	6

Engine performance and testing (measurements and instrumentations, performance curves) – Engine cooling – Friction and lubrication – Calculation of actual cycle in ICE - Continuous combustion and propulsive engines – Pollution relevant to ICE (measurements, control and environmental effects)

MPE 412 Thermal Power Plants	Lecture	Tutorial	Lab	Total
	4	2	1	7

Types of load curves – Selection and location of plants – Performance of power plants – Cost of electrical energy rate – Types of furnaces and methods of burning fuel oil – Types of draught systems and losses in air – Gas loop- Different pollutants and their treatments – Types of boilers and boilers heat balance . Boiler components .

MPE 413 Steam And Gas Turbines	Lecture	Tutorial	Lab	Total
	3	2	1	6

Introduction – Steam turbines (Basic concepts , Classification , Thermal calculations and performance) - Gas turbines (Introduction , Types , Actual and compound cycles) –

Compressor (Basic concepts , Types , Axial compressor performance analysis)- Fans (Types , Axial fan analysis) – Operation and maintenance of turbo machinery .

	The term	Lecture	Tutorial	Lab	Total
MPE 406 Project	**First semester Second semester**	**-**	**3 Extended**	**-**	**3**

Independent Integrated work leading to writing an extensive report , preparing a theoretical analysis or design study or experimental work with complete analysis in a topic relevant to the field of study .

		Lecture	Tutorial	Lab	Total
MPE 414 A	**Fluid Power Control**	**2**	**1**	**1**	**4**

Similar of hydraulic circuit with electricity – Transportation of formation through circuits by using Fluerics + Fluides – Dynamic characteristics of hydraulic circuits – Fluid impedance as a function of frequency and performance characteristics of pumps under different powers – Hydraulic servomechanisms – Design and testing of performance of hydraulic servomechanism – Choosing control valves – Discontinuity control and digital servomechanism – Development of performance by using digital technology - Programming of sequence circuits – Variable programming . Design of logic circuits .

		Lecture	Tutorial	Lab	Total
MPE 414 B	**Design of Refrigeration and Air Conditioning Equipment**	**2**	**1**	**1**	**4**

Design and selection of Evaporators , Compressors , Condenser and Expansion valves. Design of piping system of Refrigeration plants . Design of refrigeration equipment of freezing in air jet and direct contact systems . Classification of central air conditioning systems and control methods of these systems . Design of air handling units.

		Lecture	Tutorial	Lab	Total
MPE 414 C	**Design Of Internal Combustion Engines Element**	**2**	**1**	**1**	**4**

Factors influencing design configuration – Dynamics of crank slider mechanism –Design of piston group (piston – rings – pin) - Design of connecting rod (big end – small end – web – bolts) – Design of crank (crank pin – main bearings and webs) –Design of cylinder, cylinder block, cylinder head (valves – valve seats – springs – cylinder walls)

		Lecture	Tutorial	Lab	Total
MPE 415A	**Information Systems in Fluids**	**2**	**1**	**1**	**4**

Using the Internet as database and information system for internal combustion engines – Troubleshooting analysis and artificial intelligent programs . Maintenance and assigning troubleshooting – Remote diagnosis and modifying performance according to operating condition for fluid machinery systems .

		Lecture	Tutorial	Lab	Total
MPE 415 B	**Information systems in Heat And Energy Systems**	**2**	**1**	**1**	**4**

Using the Internet as database and information system for internal combustion engines – troubleshooting analysis and Artificial Intelligent programs . Maintenance and assigning troubleshooting – Remote diagnostics and modifying performance according to operating condition for Heat and energy systems .

		Lecture	Tutorial	Lab	Total
MPE 415 C	**Information Systems in Internal Combustion Engines**	**2**	**1**	**1**	**4**

Using the Internet as database and information system for internal combustion engines – troubleshooting analysis and Artificial Intelligent programs . For engines maintenance and assigning troubleshooting – Remote diagnostics and modifying engine performance according to operating condition .

MPE 421 Hydraulic System	Lecture	Tutorial	Lab	Total
	4	1	1	6

Hydraulic system course offers the different types of hydraulic systems – choice and design of units system which contains of basic elements - Hydraulic power units – Hydraulic control elements – Hydraulic action elements and control machines – Maintances of hydraulic systems .

MPE 422 Control	Lecture	Tutorial	Lab	Total
	4	1	1	6

Introduction and definitions to control terms – Mathematical models of physical control systems and transfer function - Time analysis of control of system – Frequency Response Analysis of control system – Stability analysis (absolute and relative stability – state – space representation of control systems . computer application programs for control system- (CAD , e.g. MATLAB) .

PRE 429 Projects Planning & Management	Lecture	Tutorial	Lab	Total
	3	-	-	3

Project evaluation and review techniques - Activities on arcs presentation - Activities on node presentation
Gantt charts - CPM – PERT - Assigning and balancing Resources

MPE 423 A Dynamics of Unsteady Fluid Flow	Lecture	Tutorial	Lab	Total
	3	2	1	6

Basic equations of compressible and incompressible fluid flow - Linear and non linear wave equation in one – two and three dimensions – Types of waves according to their strength – Sound generated from different mechanical systems – Moving and reflections of shock waves for different conditions – Interference of compression and rarefaction waves due to its propagation in ducts [nozzles and diffusers] – Sound generated inside Rocket motors – Waves in incompressible fluid . Flow on ducts and networks - Water hammer and its effect on the networks .

MPE 423 B Thermal Power Stations , Design and Operation	Lecture	Tutorial	Lab	Total
	3	2	1	6

Thermal power station , Design – Types of nuclear power plants – Operation of thermal power plants (Initial operation , criteria of reliable operation of power plants , start – Up and shut - down of power plants) – Steam piping (design , material , Insulation) – Air pollution by thermal power plants .

MPE 423 C Maintenance And Operation Of Internal Combustion Engines	Lecture	Tutorial	Lab	Total
	3	2	1	6

Principles of maintenance required for optimum engine operation – maintenance of ignition system for spark ignition engines – maintenance of fuel feeding systems – assembly of engine parts – maintenance process for mechanical parts of engines (valves – pistons – rings – springs – connecting rod – crankshaft – cylinders and cylinders head) – Tables of common troubleshooting in engines (Pinpointing their cause, testing methods and repairing process) .

MPE 424 A Environmental Engineering	Lecture	Tutorial	Lab	Total
	3	2	1	6

Environmental Engineering concepts – Environment conservation – Environmental systems – Wastes and their effects on environment , methods of wastes disposal , methods of

wastes treatment and methods of wastes control – Air pollution : Pollutants of air and it sources , Dangerous of air pollution , propagation and distribution of pollutants , methods of measuring air pollution , controlling air pollution , treatment of polluted air – Noise pollutions sources of noise pollution and their nature and harmful effects , controlling noise pollution – Thermal pollution – Nature and characteristics and methods of utilizing Bio- mass energy – Instruments for various pollution measuring devices , sampling and analysis .

MPE 424B	Steam and Gas Turbines Design	Lecture	Tutorial	Lab	Total
		3	2	1	6

Introduction - Force analysis on turbine blades – Calculation of turbine losses – Multistage steam turbine design – Calculation of blade dimensions – Matching of gas turbines cycle components – Performance curves – Linking components .

MPE 424C	Fuel systems In internal Combustion Engines	Lecture	Tutorial	Lab	Total
		3	2	1	6

Fuel systems in spark ignition engines (carburetors , injection systems) – Fuel systems in diesel engines – Fuel control systems at different loads in diesel engines .

16-ENROLLMENT REQUIREMENTS

Receiving the student clearing the final year of secondary school as controlled by the supreme council of universities' admission office. Students are admitted to the program specializations according to the internal regulations stating the minimum total marks for each program. This minimum number is controlled only by the demand of students to join the various disciplines while maintaining an equal student number in each program.

17-REGULATIONS FOR PROGRESSION AND PROGRAM COMPLETION

Second Year / First Semester

Students are admitted to the program according to the internal regulations stating the minimum total marks for each program. This minimum number is controlled only by the demand of students to join the various disciplines while maintaining an equal student number in each program.

Second Year / First Semester Onwards

Students have to complete all courses in each program year successfully in order to progress for the subsequent year. A student might fail in not more than two courses and still progresses to the subsequent year. However, in such a case, his/her total marks and grade is not calculated until the failed courses are cleared successfully.

The student is considered successful if he passes the examinations in all courses of his class.

a-The student is promoted to the next higher level if he fails in not more than two subjects of his class or from lower classes,

b- In addition to the two subjects mentioned in the pervious item, the student who fails in two subjects in humanities and social sciences, whether from his class or from lower classes, is admitted to the transfer to the consecutive higher level. Passing successfully in all courses before obtaining the B.Sc. degree is a prerequisite.

c- The referred student has to sit the examination in the courses in which he has failed together with the students studying the same courses . The student gets a pass grade when he passes the examination successfully. In case the student was acceptable excuse absent with acceptable excuse *in* a course, he gets the actual grade, d- The grades of the successful student in a course and in the general grade are evaluated as follows

Distinction: from 85% of the total mark and upwards.
Very good: from 75% to less than 85% of the total mark.
Good from: 65% to less than 75% of the total mark
Pass: from: 50% to less than 65% of the total mark
The grades of a failing student in a course is. estimated in one of the following grades:
Weak : from 30% to less than 50% of the total mark

Very weak: less than 30% of the total mark. The B.Sc. general grade for students is based on the cumulative marks obtained during all the years of study. The students are then arranged serially according their cumulative sum. The student is awarded an honor degree ii his cumulative sum is distinction or very good provided that he gets a grade not less than very good in any class of study other than the preparatory year. Moreover, he should have not failed in any examination he has sat in any class other than the preparatory year.

18- EVALUATION OF PROGRAM INTENDED LEARNING OUTCOMES

8.1 Programme Evaluation and Learning Outcome

Evaluator	Tool	Sample
1- Senior students	**Discussion and feed back during annual program scientific conference**	**5% of students**
2- Alumni	**Feed back from assistant staff and post graduate students**	**2%**
3- Stakeholders (Employers)	**Is currently being considered and will be included in the final reports**	
4- External Evaluator(s) (External Examiner(s))		
5- Other		

8.2 Programme ILOs Evaluation Charts

i) Charts see Appendix 3

ii) The evaluation reports

iii) Department and faculty approval

Coordinator of Program Quality assurance comittee	Head of Mechanical Engineering
Prof . Dr. Sobeih M. Selim	**Prof. Mousa M. Mohamed**

Date: 30/4/2014