

GYANMANJARI INSTITUTE OF TECHNOLOGY

Department of Mechanical Engineering

Elements Of Mechanical Engineering (2110006)

Semester / Year : 1ST Semester/ 2015-16

Batch : _____

Name of Faculty : _____

T / P : Practical

INDEX

No.	Date	Title	No. of Pages	Marks	Date of Assessment	Sign of Faculty
1		To study about the construction and working of various types of boilers.				
2		To study about the construction and working of different boiler mountings & accessories.				
3		To study about the construction and working of Petrol Engines.				
4		To study about the construction and working of Diesel Engines.				
5		To determination of brake thermal efficiency of an I.C. Engine.				
6		To study about the construction and working of different types of Pump				
7		To study about the construction and working of different types of Air compressors				
8		Demonstration of vapor compression refrigeration cycle of domestic refrigerator, window air conditioner & split air conditioner.				
9		To study about the construction, working and applications of different types of coupling, clutches and brake.				
10		Demonstration of various types of gear drives, belt drive and pulleys.				

ELEMENTS OF MECHANICAL ENGINEERING (2110006)

Date:

Practical No. 1

AIM:

To study about the construction & working of various types of Boilers

OBJECTIVES:

1. To be able to understand working of steam boilers.
2. To be able to differentiate between different types of boilers.
3. To understand boiler mounting and accessories.

OUTCOMES:

To understand and appreciate significance of boilers in different fields of Engineering.

THEORY:

A boiler or a steam generator is a closed vessel in which steam is generated at desired pressure, temperature, and rate, from water by burning fuel in the boiler furnace. The steam generated in the boiler is used for power generation, process heating or space for heating. The function of boiler is to facilitate the generation of steam by providing the necessary heat transfer surface, space for storage of water and steam furnace for burning the fuel and necessary equipment for control of its operation.

Technically speaking a boiler consists only of the container vessel and the heat transfer surfaces while the steam generator comprises of the whole unit consisting of drum, tubes, super heater, air heater, economizer etc. according to the Indian boiler regulations (I.B.R) a boiler is a closed pressure vessel with capacity exceeding 22.75 liters used for generating steam under pressure.

QUESTIONS:

1. What is a boiler?
2. Classification of the boiler.
3. Explain various types of Boilers
 - a. Cochran Boiler
 - b. Lancashire Boiler
 - c. Babcock-Wilcock Boiler
4. Comparison the fire tube boiler and water tube boiler.
5. General specification of a boiler.
6. Applications of boiler.

REFERENCES:

1. Elements of Mechanical Engineering Desai & Soni
2. Elements of Mechanical Engineering Mathur & Mehta
3. Elements of Mechanical Engineering Hajara Chaudhary
4. Basic Mechanical Engineering Dr. R.P. Arora, B.K.Ragunath & J.P. Patel

Marks obtained

Signature of faculty

Date

GYANMANJARI INSTITUTE OF TECHNOLOGY

Department of Mechanical Engineering

ELEMENTS OF MECHANICAL ENGINEERING (2110006)

Date:

Practical No. 2

AIM:

To study about the construction and working of different boiler mountings & accessories.

OBJECTIVES:

To be able to understand working of mountings and accessories of steam boilers.

OUTCOMES:

To understand and appreciate significance of boilers in different fields of Engineering.

THEORY:

Mountings are fittings that are mounted on the boiler and are compulsory as per IBR for safe operation of the boiler. Lancashire and Cornish type boilers should be fitted with high pressure and low water safety valve. According to IBR the following mounting should be fitted to the boilers:

- safety valves, water level indicator, combined high steam and low water safety valve, fusible plug, steam gauge, feed check valve, man hole, blow-off cock, steam stop valve.

Boiler accessories are the appliances which are installed with a boiler in its neighboring area to increase the efficiency of the boiler plant and to help in the smooth working of the boiler plant. The principal steam boiler accessories attached to modern boiler are:

- feed water pump, economizer, air preheater, injector, super heater.

QUESTIONS:

1. Differentiate between boiler mounting and accessories.
2. Explain the function, location and working of the Fusible plug, spring loaded safety valve, Water level indicator & Blow off cock.
3. Explain types of Boiler Accessories.

REFERENCES:

1. Elements of Mechanical Engineering Desai & Soni
2. Elements of Mechanical Engineering Mathur & Mehta
3. Elements of Mechanical Engineering Hajara Chaudhary
4. Basic Mechanical Engineering Dr. R.P. Arora, B.K.Ragunath & J.P. Patel

Marks obtained

Signature of faculty

Date

ELEMENTS OF MECHANICAL ENGINEERING (2110006)

Date:

Practical No. 3

AIM:

To study about the construction and working of Petrol Engines.

OBJECTIVES:

1. To be able to understand working of Petrol engines.
2. To be able to differentiate between two stroke and four stroke petrol engine.

OUTCOMES:

To understand and appreciate significance of IC ENGINES in different fields of Engineering.

THEORY:

A petrol engine (known as a gasoline engine) is an internal combustion engine with spark-ignition, designed to run on petrol (gasoline) and similar volatile fuels. It was invented in 1876 in Germany by German inventor Nicolaus August Otto. In most petrol engines, the fuel and air are usually pre-mixed before compression (although some modern petrol engines now use cylinder-direct petrol injection). The pre-mixing was formerly done in a carburetor, but now it is done by electronically controlled fuel injection, except in small engines where the cost/complication of electronics does not justify the added engine efficiency. The process differs from a diesel engine in the method of mixing the fuel and air, and in using spark plugs to initiate the combustion process. In a diesel engine, only air is compressed (and therefore heated), and the fuel is injected into very hot air at the end of the compression stroke, and self-ignites.

QUESTIONS:

1. Working of four stroke petrol engine with neat sketch.
2. Working of two stroke petrol engines with neat sketch.
3. Comparison of two stroke engines and four stroke engines.
4. Comparison of the petrol engine (Otto cycle) and diesel engine (diesel cycle).
5. Applications of the petrol engine.

REFERENCES:

1. Elements of Mechanical Engineering Desai & Soni
2. Elements of Mechanical Engineering Mathur & Mehta
3. Elements of Mechanical Engineering Hajara Chaudhary
4. Basic Mechanical Engineering Dr. R.P. Arora, B.K.Raghunath & J.P. Patel

Marks obtained

Signature of faculty

Date

ELEMENTS OF MECHANICAL ENGINEERING (2110006)

Date:

Practical No. 4

AIM:

To about study the construction and working of Diesel Engines.

OBJECTIVES:

1. To be able to understand working of Diesel engines.
2. To be able to differentiate between two stroke and four stroke diesel engine.

OUTCOMES:

To understand and appreciate significance of IC ENGINES in different fields of Engineering.

THEORY:

A diesel engine (also known as a compression-ignition engine) is an internal combustion engine that uses the heat of compression to initiate ignition and burn the fuel that has been injected into the combustion chamber. This contrasts with spark-ignition engines such as a petrol engine (gasoline engine) or gas engine (using a gaseous fuel as opposed to gasoline), which use a spark plug to ignite an air-fuel mixture. The engine was developed by German inventor Rudolf Diesel in 1893.

The diesel engine has the highest thermal efficiency of any standard internal or external combustion engine due to its very high compression ratio. Low-speed diesel engines (as used in ships and other applications where overall engine weight is relatively unimportant) can have a thermal efficiency that exceeds 50%.

Diesel engines are manufactured in two-stroke and four-stroke versions. They were originally used as a more efficient replacement for stationary steam engines. Since the 1910s they have been used in submarines and ships.

QUESTIONS:

1. Why diesel engines are called C.I. engines?
2. Working of four stroke diesel engine with neat sketch.
3. Working of two stroke diesel engine with neat sketch.

REFERENCES:

1. Elements of Mechanical Engineering Desai & Soni
2. Elements of Mechanical Engineering Mathur & Mehta
3. Elements of Mechanical Engineering Hajara Chaudhary
4. Basic Mechanical Engineering Dr. R.P. Arora, B.K.Raghunath & J.P. Patel

Marks obtained

Signature of faculty

Date

ELEMENTS OF MECHANICAL ENGINEERING (2110006)

Date:

Practical No. 5

AIM:

To determination of brake thermal efficiency of an I.C. Engine

OBJECTIVES:

1. To be able to understand brief about an IC ENGINE
2. To be able to calculate piston speed, brake power and Brake thermal efficiency.

OUTCOMES:

To understand the relationship between the power, torque and other parameters.

THEORY:

With a growing demand for transportation IC engines have gained lot of importance in automobile industry. It is therefore necessary to produce efficient and economical engines. While developing an IC engine it is required to take in consideration all the parameters affecting the engines design and performance. There are enormous parameters so it becomes difficult to account them while designing an engine. So it becomes necessary to conduct tests on the engine and determine the measures to be taken to improve the engines performance.

QUESTIONS:

- 1) Introduction to the I.C. engines.
- 2) Comparison of I.C. engine and E.C. engine.
- 3) Classification of the I.C. engines.
- 4) Applications of I.C. engines.
- 5) Explain the following terms related to I.C. engine :
 - (a) Compression ratio
 - (b) Piston speed
 - (c) Brake power
 - (d) Brake thermal efficiency
 - (e) Bore
 - (f) Stroke
 - (g) Mechanical efficiency
- 6) Numerical based on brake thermal efficiency.

REFERENCES:

1. Elements of Mechanical Engineering Desai & Soni
2. Elements of Mechanical Engineering Mathur & Mehta
3. Elements of Mechanical Engineering Hajara Chaudhary
4. Basic Mechanical Engineering Dr. R.P. Arora, B.K.Raghnath & J.P. Patel

Marks obtained

Signature of faculty

Date

Practical No. 6

AIM:

To study about the construction & working of different types of Pump

OBJECTIVES:

1. To understand the various types of pump
2. Classification of pump

OUTCOMES:

Able to understand working of pump

THEORY:

The pump is a mechanical device which conveys liquid from one place to another. It can be also define as a machine that transfers the mechanical energy of a motor or an engine in to potential, kinetic, and thermal energy pump belongs to the category of power absorbing machines. Pumping is the addition of energy to move it from one place to another. The pumps used to handle water are called hydraulic pumps. Other common types of pump are fuel pumps, oil pumps, mud pumps etc.

QUESTIONS:

1. Define pump and classify different types of pumps.
2. Explain with neat sketch different types of casing in centrifugal pump.
3. What is priming? Why priming is required in centrifugal pump?
4. What is reciprocating pump? Explain single acting and double acting reciprocating pump.
5. Difference between plunger and piston pump.

REFERENCES:

1. Elements of Mechanical Engineering Desai & Soni
2. Elements of Mechanical Engineering Mathur & Mehta
3. Elements of Mechanical Engineering Hajara Chaudhary
4. Basic Mechanical Engineering Dr. R.P. Arora, B.K.Raghunath & J.P. Patel

Marks obtained

Signature of faculty

Date

GYANMANJARI INSTITUTE OF TECHNOLOGY

Department of Mechanical Engineering

ELEMENTS OF MECHANICAL ENGINEERING (2110006)

Date:

Practical No. 7

AIM:

To about study the construction and working of different types of Air compressors

OBJECTIVES:

1. To understand the various types of Air compressors
2. Classification of Air compressors

OUTCOMES:

Able to understand working of Air compressors.

THEORY:

The compressor is the machine which handles a compressible fluid and pressurizes it by doing work on it. The fluid can be air, gas or vapour. It can be also defined as a machine which takes in air at low pressure and compresses it to high pressure with the help of some suitable arrangement. i.e. reciprocating piston and cylinder arrangement or rotary arrangement it is called an air compressor.

Generally an air compressor takes in air at the atmospheric pressure. It is compressed to high pressure and delivered it is to a storage tank. From the storage tank it is taken out for different uses through the pipe lines. The compressor is driven with the help of some prime mover.

QUESTIONS:

1. Classification of Air Compressor.
2. Comparison of Positive Displacement and Dynamic Compressor.
3. Expression of Work required on Reciprocating Air Compressor.
4. Types of Rotary Air Compressors.

REFERENCES:

1. Elements of Mechanical Engineering Desai & Soni
2. Elements of Mechanical Engineering Mathur & Mehta
3. Elements of Mechanical Engineering Hajara Chaudhary
4. Basic Mechanical Engineering Dr. R.P. Arora, B.K.Raghunath & J.P. Patel

Marks obtained

Signature of faculty

Date

GYANMANJARI INSTITUTE OF TECHNOLOGY

Department of Mechanical Engineering

ELEMENTS OF MECHANICAL ENGINEERING (2110006)

Date:

Practical No. 8

AIM:

Demonstration of vapor compression refrigeration cycle of domestic refrigerator and window air conditioner and split air conditioner.

OBJECTIVES:

1. To be able to understand VCRS.
2. To be able to understand VARS.
3. To be able to understand Domestic Refrigerator.
4. To be able to understand Split Air Conditioner.

OUTCOMES:

Able to understand working of refrigeration system.

THEORY:

Refrigeration may be defined as producing and maintaining temperature below surrounding temperature. The system maintained at the lower temperature is known as refrigerated system while equipment used to maintain this lower temperature is known as refrigerating equipment. According to Clausius statement of second law of thermodynamics, to transfer heat from low temperature body to high temperature body external work must be supplied. The working substance used in refrigerating equipment is known as refrigerant.

Air conditioning means control of temperature, humidity, air movement, purity of air and noise.

QUESTIONS:

1. What is refrigerant? Write widely used refrigerant and its properties.
2. Explain Vapour compression refrigeration cycle with neat sketch.
3. Explain Vapour absorption refrigeration cycle with neat sketch.
4. Domestic Refrigerator.
5. Split Air Conditioner.

REFERENCES:

1. Elements of Mechanical Engineering Desai & Soni
2. Elements of Mechanical Engineering Mathur & Mehta
3. Elements of Mechanical Engineering Hajara Chaudhary
4. Basic Mechanical Engineering Dr. R.P. Arora, B.K.Raghunath & J.P. Patel

Marks obtained

Signature of faculty

Date

GYANMANJARI INSTITUTE OF TECHNOLOGY

Department of Mechanical Engineering

ELEMENTS OF MECHANICAL ENGINEERING (2110006)

Date:

Practical No. 9

AIM:

To study about construction, working and applications of different types of coupling, clutch and brake.

OBJECTIVES:

1. To be able to understand various types of couplings.
2. To be able to understand various types clutches
3. To be able to understand various types Brakes.

OUTCOMES:

Able to understand working of couplings, clutches and brakes.

THEORY:

Mechanical power is transmitted from the prime mover to a machine, from one machine to another or from one member of machine to another, by means of intermediate mechanism called drives. The drives are used instead of directly coupling the prime mover to machine due to following reasons: (1) The prime movers have high speed while the machine require a smaller speed with larger torque. (2) The speed of driven member may have to be frequently changed where as the speed of prime mover should be kept constant for its use to the full advantage. (3) Sometimes, several machines are operated from only one prime mover e.g. group drive. (4) Sometimes the machines are not coupled directly to the prime mover shaft due to considerations of safety, convenience and maintenance.

QUESTIONS:

- 1) Explain various types of couplings.
- 2) Explain various types of clutches.
- 3) Explain various types of brakes.

REFERENCES:

1. Elements of Mechanical Engineering Desai & Soni
2. Elements of Mechanical Engineering Mathur & Mehta
3. Elements of Mechanical Engineering Hajara Chaudhary
4. Basic Mechanical Engineering Dr. R.P. Arora, B.K.Raghunath & J.P. Patel

Marks obtained

Signature of faculty

Date

GYANMANJARI INSTITUTE OF TECHNOLOGY

Department of Mechanical Engineering

ELEMENTS OF MECHANICAL ENGINEERING (2110006)

Date:

Practical No. 10

AIM:

Demonstration of various types of gear drives, belt drive and pulleys.

OBJECTIVES:

1. To be able to understand various types of Gear drive, Belt drive and Chain drive.
2. To be able to understand various types gears.

OUTCOMES:

Able to understand working of gear, chain and pulley.

THEORY:

Mechanical power is transmitted from the prime mover to a machine, from one machine to another or from one member of machine to another, by means of intermediate mechanism called drives. The drives are used instead of directly coupling the prime mover to machine due to following reasons: (1) The prime movers have high speed while the machine require a smaller speed with larger torque. (2) The speed of driven member may have to be frequently changed where as the speed of prime mover should be kept constant for its use to the full advantage. (3) Sometimes, several machines are operated from only one prime mover e.g. group drive. (4) Sometimes the machines are not coupled directly to the prime mover shaft due to considerations of safety, convenience and maintenance.

QUESTIONS:

1. Methods of drive.
2. Types of bearing.
3. Working of different belt drives.
4. What is the difference between group drive and individual drive?
5. Draw neat sketch of all types of pulleys and its working.
6. Explain gear terminology.
7. Compare belt drive and gear drive.

REFERENCES:

1. Elements of Mechanical Engineering Desai & Soni
2. Elements of Mechanical Engineering Mathur & Mehta
3. Elements of Mechanical Engineering Hajara Chaudhary
4. Basic Mechanical Engineering Dr. R.P. Arora, B.K.Raghunath & J.P. Patel

Marks obtained

Signature of faculty

Date