

# PRESIDENCY UNIVERSITY BENGALURU

**Semester :** Semester I

**Course :** MEC1004/MEC101

# SCHOOL OF ENGINEERING

 **SUMMER TERM, END EXAMINATION -2024**

**Date :** 05/08/2024

**Time :** 9.30 AM -12.30 PM

**Course Name :** Elements of Mechanical Engineering

**Program :** B.Tech. Mechanical Engineering

**Max Marks :** 100

**Weightage :** 50%

**Instructions:**

1. *Read all questions carefully and answer accordingly.*
2. *Question paper consists of 3 parts.*
3. *Scientific and non-programmable calculator are permitted.*
4. *Do not write any information on the question paper other than Roll Number.*

**PART A**

**ANSWER ANY 5 QUESTIONS (5 X 2 = 10M)**

1. Write 2 units of Energy.

1. During Photosynthesis, which energy conversion takes place during photosynthesis
2. Which part of the Engine connects Piston and Crank?
3. What is the purpose of using flux in brazing?
4. Which method is used to join electrical equipment?
5. Operation used for enlarging the end of the hole to give a conical shape.

(CO1) [Knowledge]

(CO1) [Knowledge]

(CO2) [Knowledge]

(CO3) [Knowledge]

(CO4) [Knowledge]

(CO4) [Knowledge]

**PART B**

**ANSWER ANY 5 QUESTIONS (5 X 10 = 50M)**

1. An **internal combustion engine** (**ICE** or **IC engine**) is a heat engine in which fuel combustion occurs with an oxidizer (usually air) in a combustion chamber that is an integral part of the working fluid flow circuit. Draw a well-labelled diagram of an Internal Combustion Engine along with the function of each part.

(CO2) [Comprehension]

1. A turbine “X” is invented by Austrian scientist, Viktor Kaplan in 1913. This turbine “X” is a reaction- type water turbine, which extracts energy from the pressure energy of moving water and it is axial Turbine. Identify the Turbine “X” and explain its working with a neat diagram.

(CO3) [Comprehension]

1. There is a drive which is one of the ways of transmitting mechanical power from one place to another. It is often used to convey power to the wheels of a vehicle, particularly bicycles and motorcycles. Write the advantages and disadvantages of the chain drive power transmission system.

(CO3) [Comprehension]

1. A “Y” machine is known as the mother of all machines. In this machine, the workpiece rotates about an axis of rotation to perform various operations. Identify the machine and explain the major parts of the machine.

(CO4) [Comprehension]

1. Describe any three operations (from each) of Drilling and Milling with diagrams.

(CO4) [Comprehension]

1. With a neat sketch explain the working of Babcock & Wilcox Boiler.

Mention its advantages & disadvantages. (CO3) [Comprehension]

**PART C**

**ANSWER ALL THE QUESTIONS (2 X 20 = 40M)**

1. A 4-stroke engine has a piston diameter of 250mm and a stroke of 400mm. The mean effective pressure is 4 bar, the speed is 500 rpm and the torque is 200 Nm. Find the indicated power, brake power and friction power.

(CO3) [Application]

1. Solve the following questions.
2. Two gears are in mesh with each other. Gear 1 is having 144 teeth on its surface and rotates at 8 rad/s and another gear is having 72 teeth. Calculate the angular velocity of the second gear.
3. You are the operator of a lathe machine which is working on a belt-pulley arrangement. It is observed that tensions on the belt are 400 N and 150 N and the linear velocity of the belt is 3.5 m/s. The operator of the machine is asked to calculate the power transmitted by the belt drive.

(CO3) [Application]

1. A single-cylinder 4-stroke engine runs at 1000 rpm and has a bore of 115mm and a stroke of 140mm. The brake torque is 36 Nm and mechanical efficiency = 80 %. Calculate brake power and mean effective pressure.

(CO3) [Application]

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