



**PRESIDENCY UNIVERSITY
BENGALURU**

**SCHOOL OF ENGINEERING
END TERM EXAMINATION - FEB 2023**

Semester : Semester I - 2022

Course Code : MEC1004

Course Name : Sem I - MEC1004 - Elements of Mechanical Engineering

Program : B.Tech. Mechanical Engineering

Date : 23-FEB-2023

Time : 1.00PM - 4.00PM

Max Marks : 100

Weightage : 50%

Instructions:

- (i) Read all questions carefully and answer accordingly.
- (ii) Question paper consists of 3 parts.
- (iii) Scientific and non-programmable calculator are permitted.
- (iv) Do not write any information on the question paper other than Roll Number.

PART A

ANSWER ALL THE QUESTIONS

(10 X 2 = 20M)

1. Out of these, Which can be unit of Energy?
a) watts (CO1) [Knowledge]
b) calorie
c) N/s
d) All of these
2. During Photosynthesis, which energy conversion takes place
a) Electrical to sound energy (CO1) [Knowledge]
b) Light to chemical Energy
c) Electrical to heat energy
d) Chemical to heat energy
3. Which part of Engine connects Piston and Crank?
a) Piston Pin (CO2) [Knowledge]
b) Connecting Rod
c) Crankshaft
d) Piston Rings

4. Compression ratio of I.C. Engines is (CO2) [Knowledge]
- a) The ratio of volumes of air in cylinder before compression stroke and after compression stroke
 - b) Volume displaced by piston per stroke and clearance volume in cylinder
 - c) Ratio of pressure after compression and before compression
 - d) Swept volume/cylinder volume
5. Which of the following can be used to convert rotary into linear motion. (CO3) [Knowledge]
- a) Spur Gear
 - b) Rack And Pinion
 - c) Worm Gear
 - d) Bevel Gear
6. What is the function of Idler gear? (CO3) [Knowledge]
- a) To give support to Driver gear
 - b) To give support to Driven gear
 - c) for desired direction of Driven gear
 - d) None of these
7. Speed ratio of a gear drive if driver speed is 100 rpm and driven gear speed is 25 rpm. (CO3) [Knowledge]
- a) 2
 - b) 0.5
 - c) 0.25
 - d) 3
8. The purpose of using flux in brazing is to..... (CO4) [Knowledge]
- a) make stronger joint
 - b) Wash away surplus filler material
 - c) Increase fluidity of filler metal
 - d) Fill up gaps left in a bad joint
9. Operation of enlarging the end of the hole to give conical shape at end is known as (CO4) [Knowledge]
- a) Drilling
 - b) Counter Boring
 - c) Boring
 - d) Counter sinking
10. Which of the method is used to join electrical equipments? (CO4) [Knowledge]
- a) Brazing
 - b) Gas Welding
 - c) Spot Welding
 - d) Soldering

PART B

ANSWER ALL THE QUESTIONS

(5 X 10 = 50M)

11. An **internal combustion engine (ICE or IC engine)** is a heat engine in which the combustion of a fuel 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]
12. 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 neat diagram.
(CO3) [Comprehension]
13. 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 advantage and disadvantage of chain drive power transmission system.
(CO3) [Comprehension]
14. A “Y” machine is known as mother of all machines. In this machine, workpiece rotates about an axis of rotation to perform various operations. Identify the machine and explain the major parts of the machine.
(CO4) [Comprehension]
15. Describe any three operations (from each) of Drilling and Milling with diagrams.
(CO4) [Comprehension]

PART C

ANSWER ALL THE QUESTIONS

(3 X 10 = 30M)

16. A 4-stroke engine has a piston diameter 250mm and stroke 400mm. The mean effective pressure is 4 bar, speed is 500 rpm and the torque is 200 Nm. Find the indicated power, brake power and friction power.
(CO2) [Application]
17. Solve the following questions.
1. 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 second gear.
2. You are the operator of a lathe machine which is working on belt-pulley arrangement. It is observed that tensions on belt are 400 N and 150 N and the linear velocity of belt is 3.5 m/s. Operator of the machine is asked to calculate the power transmitted by the belt drive.
(CO3) [Application]
18. 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.
(CO2) [Application]
