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**PRESIDENCY UNIVERSITY  
BENGALURU**

**SCHOOL OF ENGINEERING**

**MAKE UP EXAMINATION – JAN 2023**

**Course Code:** MEC 1004

**Course Name:** Elements of Mechanical Engineering

**Program:** B.Tech

**Date:** 24-JAN-2023

**Time:** 09:30 AM to 12:30 PM

**Max Marks:** 100

**Weightage:**50%

**Instructions:**

- (i) Read all the questions carefully and answer accordingly.
- (ii) Scientific calculators are permitted
- (iii) You are not permitted to share dictionaries, calculators or any other materials during the examination.

**Part A [Memory Recall Questions]**

**Answer all the Questions. Each question carries five marks.**

**(6Qx 5M= 30M)**

1. Explain the operations that can be performed in a Lathe Machine. (C.O.No.4) [Knowledge]
2. Write the advantages and disadvantages of Belt Drive. (C.O.No.3) [Knowledge]
3. What do you mean by Machine tools? (C.O.No.4) [Knowledge]
4. Write the difference between SI Engine and CI Engine. (C.O.No.2) [Knowledge]
5. Write the classification of Water turbines. (C.O.No.2) [Knowledge]
6. Name different types of gear used for power transmission. Which type of gear is used for following application? (C.O.No.3) [Knowledge]
  - A. For power transmission between two intersecting shafts at right angle.
  - B. For converting rotary motion to linear motion.
  - C. For transmitting power between two parallel shafts

**Part B [Thought Provoking Questions]**

**Answer all the Questions. Each question carries ten marks.**

**(4Qx10M=40M)**

7. A turbine "X" is invented by American scientist, Lester Allan in 1870s. This turbine "X" is an impulse-type water turbine, which extracts energy from the impulse of moving water. Identify the Turbine "X" and explain its working with neat diagram. (C.O.No.2) [Comprehension]
8. Suppose we have an ice cube at 0°C and heat energy at constant pressure is being supplied to convert it into steam of 150 °C. Draw Temperature-Enthalpy line diagram for this process and clearly mention all the process. (C.O.No.1) [Comprehension]
9. A machine "Y" 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. (C.O.No.4) [Comprehension]

10. There is a toothed wheel that works with others to alter the relation between the speed of a driving mechanism (such as the engine of a vehicle) and the speed of the driven parts (the wheels). Identify the type of Transmission Drive and Explain the different types of it with proper diagram. (C.O.No.3) [Comprehension]

### Part C [Problem Solving Questions]

Answer all the Questions. Each question carries ten marks.

(3Qx10M=30M)

11. Calculate how much heat is being required to convert 3.2 kg of ice at  $-40^{\circ}\text{C}$  into steam at  $150^{\circ}\text{C}$ ? Latent heat of fusion is 334 kJ/kg. Latent heat of vaporization is 2260 kJ/kg. Specific heat of ice, water and steam are 2.108 kJ/kg K, 4.187 kJ/kg K and 1.996 kJ/kg K respectively. (C.O.No.1) [Application]
12. A 4 cylinder 2-stroke engine develops 26 kW brake power at 2200 rpm. The mean effective pressure is 7 bar and  $\eta_{\text{mech}} = 87\%$ . Determine the bore diameter and stroke of the engine, if the stroke length is 1.5 times the bore. (C.O.No.2) [Application]
13. An engine is driving a generator by means of a belt. The pulley on the driving shaft has a diameter of 550 mm & run at 276 rpm. If the radius of the pulley on the generator is 150 mm. Find its rpm. (C.O.No.3) [Application]