Seat No: _____ **Enrollment No: _____**

PARUL UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

B.Tech. Winter 2022 - 23 Examination

Semester:1 **Date: 30-01-2023**
Subject Code: 303109102 **Time: 2.00pm to 4.30pm**
Subject Name: Elements of Mechanical Engineering **Total Marks: 60**

Instructions:
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 Objective Type Questions (Each of one mark) **(15)**

1. For isolated system _____ can cross boundary of the system
(a) only mass (b) only energy (c) neither mass nor energy (d) none of above
2._____ is a unit of Mechanical power.
(a) joule b) watt (c) Pascal (d) newton
3. Constant volume process is also known as
(a) Isentropic process b) isobaric process (c) isothermal process (d) isochoric process
4. If dryness fraction of steam equals to 1, condition of steam will be
(a) subcooled (b) wet steam (c) Dry saturated (d) superheated
5. Petrol engine is also known as _____ Ignition engine.
(a) Compression (b) spark (c) light (d) None of above
6. In four stroke engine all four stroke are competed in_____ Revolution of crankshaft.
7. _____ valve is used to regulate flow of steam in the boiler.
8. When two shaft are rotated in opposite direction then _____ belt Drive is used.
9. Energy that can be reused again is known as _____ source of energy.
10. In a compressor, the work done is 180KJ and heat Rejected to surrounding is 50KJ.The change in internal Energy is _____
11. Define Mechanical Efficency in Engine.
12. Write function of blow off cock valve in boiler.
13. Define Coupling
14. What is difference between Spur and helical Gear?
15. Define pump.

Q.2 Answer the following questions. (Attempt any three) **(15)**

A) Differentiate among wet, dry and superheated steam.
B) Derive the relationship between specific heat at constant pressure, Specific heat at constant volume and gas Constant. ($C_p - C_v = R$)
C) Write difference between Petrol Engine stroke and Diesel engine.
D) Classify Pumps and write its applications.

Q.3 A) Explain with neat sketch working of Cochran boiler. **(07)**
B) Describe with neat sketch Vapour compression Refrigeration cycle **(08)**

OR

B) 1kg of air at 7 bar pressure and 90^0C Temperature undergoes a non-flow Polytropic process. The law of expansion is $PV^{1.1}$ = Constant. The pressure falls to 1.4 bar during the process. Calculate final Temperature work done and internal energy. Take R=287 J/kg K and Υ=1.4 for air. **(08)**

Q.4 A) Derive Expression for ideal Gas equation.PV=mRT **(07)**

OR

A) A four cylinder four stroke petrol engine is to be design to give brake power of 185KW at 35 RPS. The stroke to bore ratio to be 1.5.Assuming Mechanical Efficiency of 75% and indicated mean effective pressure of 830Kpa. Determine required Bore and stroke. **(07)**
B) Explain With P-V Diagram different strokes of Four stroke Petrol Engine. **(08)**