Seat No.: _____                                    Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY
## BE – SEMESTER 1&2 EXAMINATION – SUMMER 2020

**Subject Code: 3110006**                                    **Date:06/11/2020**
**Subject Name: Basic Mechanical Engineering**
**Time: 10:30 AM TO 01:00 PM**                     **Total Marks: 70**
**Instructions:**
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

|  |  |  | MARKS |
|---|---|---|---|
| Q.1 | (a) | Discuss Closed, Open and Isolated Thermodynamic system with neat sketch. | 03 |
|  | (b) | Define the terms: Hardness, Toughness, Ductility, Elasticity | 04 |
|  | (c) | Derive an expression for internal energy for a closed system | 07 |
| Q.2 | (a) | Distinguish between coupling and clutch. | 03 |
|  | (b) | Explain Equivalent evaporation and factor of evaporation | 04 |
|  | (c) | The heat transfer from a heat reservoir is proportional to its temperature:  Justify by deriving equation. | 07 |
|  |  | **OR** |  |
|  | (c) | Explain construction and working of centrifugal  pump with a neat sketch | 07 |
| Q.3 | (a) | Explain the construction and function of Steam Trap with neat sketch | 03 |
|  | (b) | Write the uses of "Steam Tables" | 04 |
|  | (c) | 1.5kg of steam at a pressure of 10bar and temperature of 250°C is expanded until the pressure becomes 2.8 bars. The dryness fraction of steam is then 0.9. Calculate change in Internal Energy | 07 |
|  |  | **OR** |  |
| Q.3 | (a) | List different mountings of boiler and explain any one in brief. | 03 |
|  | (b) | Derive the equation for air standard efficiency of Otto cycle. | 04 |
|  | (c) | A petrol engine with a stroke length of 200 mm and diameter of 150 mm has a clearance volume of $7 \times 10^5$ mm$^3$. If the indicted thermal efficiency is 0.30, find the relation efficiency. If the effective pressure is 5 bar and engine runs at 1000 rpm. Find the IP of the engine. take $\gamma=1.4$ | 07 |
| Q.4 | (a) | Discuss with neat sketch Diaphragm pump. | 03 |
|  | (b) | Distinguish between Reciprocating and Rotary Compressor. | 04 |
|  | (c) | Discuss the construction and working of four stroke Petrol engine. | 07 |
|  |  | **OR** |  |
| Q.4 | (a) | Draw a neat sketch of p-v diagram showing Free Air Delivery for air compressor. | 03 |
|  | (b) | Define the terms 'Refrigeration', "Ton of Refrigeration" and "Coefficient of Performance" | 04 |

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|---|---|---|---|
| | **(c)** | Calculate the energy consumed in one month for following conditions: COP of air-conditioning unit : 5 <br> Capacity of air conditioner : <br> 2 TR No of air conditioners <br> : 8 <br> All air conditioners run for 4 hours/day. | **07** |
| **Q.5** | **(a)** | What is throttling calorimeter? Explain its limitation | **03** |
| | **(b)** | Discuss with neat sketch any two boiler accessories. | **04** |
| | **(c)** | Give comparison between Belt, Chain and Gear drive. | **07** |

**OR**

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|---|---|---|---|
| **Q.5** | **(a)** | How metals are classified? Show with block diagram | **03** |
| | **(b)** | Define velocity ratio of pulleys and discuss effect of slip and creep on motion transmission | **04** |
| | **(c)** | Discuss the following with application and Properties: <br>     (i)   Glass <br>     (ii)  Ceramic <br>     (iii) Plastics | **07** |

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