Division & Roll No.:_____ Enrolment No.: _____

Darshan Institute of Engineering & Technology

B.E. Semester – I ● Pre GTU Examination – February 2021

Subject Code : 3110006 **Date :** 17/02/2021

Subject Name : Basic Mechanical Engineering

Time : 11:30 am to 1:30 pm **Total Marks :** 56

Instructions :
1. Attempt any **FOUR** out of **SEVEN** questions.
2. Figure to the right indicate full marks.
3. Don't do any kind of rough work or calculation in Question Paper.

Q. 1	**(A)**	What do you mean by thermodynamic system? Explain in brief types of thermodynamic systems with suitable examples.	**03**
	(B)	What is refrigeration? What is refrigeration effect? With neat sketch explain construction and working of window air conditioner.	**04**
	(C)	Give difference between fire tube and water tube boiler. Explain working of Babcock Wilcox boiler with neat sketch.	**07**
Q. 2	**(A)**	Differentiate: Belt drive, chain drive and gear drive.	**03**
	(B)	Define isothermal process. Derive the expression for work done, change in internal energy and heat transfer for this process.	**04**
	(C)	Explain four stroke petrol engine with neat sketch.	**07**
Q. 3	**(A)**	Define the terms: **(1)** Tensile strength **(2)** Toughness **(3)** Hardness **(4)** Ductility **(5)** Brittleness **(6)** Elasticity	**03**
	(B)	What is an adiabatic process? For adiabatic process prove that $pv^{\gamma} = C$.	**04**
	(C)	What do you understand by the term 1 ton of refrigeration? Explain vapour compression refrigeration system with neat sketch.	**07**
Q. 4	**(A)**	Prove that $C_p - C_v = R$ with usual notations.	**03**
	(B)	Explain Temperature- Enthalpy Diagram for water.	**04**
	(C)	Explain the difference between boiler mountings and accessories? Write the function and draw neat labeled sketch of **(1)** Burden pressure gauge **(2)** Fusible plug **(3)** Economizer in boiler plant.	**07**
Q. 5	**(A)**	Differentiate between four stroke and two stroke I.C engines.	**03**
	(B)	What is throttling process? Explain throttling calorimeter with neat sketch. Derive equation for dryness fraction.	**04**
	(C)	What is belt drive? Describe briefly types of belt drives with sketch.	**07**

Q. 6 **(A)** Following readings were taken during test on single cylinder four stroke oil engine, **03**

Cylinder diameter	= 250 mm
Stoke length	= 400 mm
Mean effective pressure	= 6.5 bar
Engine speed	= 250 rpm
Net load on brake	= 1080 N
Effective diameter of brake	= 1.5 m
Fuel used per hour	= 10 kg
Calorific value of fuel	= 44300 kJ/kg

Calculate: **(1)** Indicated Power **(2)** Brake power.

(B) Explain working of a centrifugal pump. **04**

(C) With usual notations derive expression for air standard efficiency of Otto cycle. **07**

Q. 7 **(A)** Draw neat and labeled sketches of following: **03**
(1) Protected flange coupling **(2)**Internal expanding shoe brake.

(B) Why multi-stage compression is required? Write advantages of the multi-staging compression. **04**

(C) Derive equation for air standard efficiency of Diesel cycle with the help of p-V diagram. **07**

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