Seat No.: _____ Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**B. E. - SEMESTER –I • EXAMINATION – WINTER 2012**

**Subject code: 110006** **Date: 22-01-2013**

**Subject Name: Elements Of Mechanical Engineering**

**Time: 10.30 am – 01.00 pm** **Total Marks: 70**

## Instructions:

1. **Attempt any five questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

**Q.1 (a) Give S.I. Units of Followings:** **07**

| | | |
|---|---|---|
| (1) Work | (2) Enthalpy | (3) Mean effective pressure |
| (4) Heat | (5) Power | (6) Force |
| (7) Energy | (8) Specific Heat | (9) Specific volume |
| (10) Calorific value | (11) Stroke | (l2) Dryness fraction |
| (13) Efficiency | (14) Swept Volume | |

**(b)** Answer Following: **07**

1) Two stroke Diesel cycle is completed in _____ revolution of crank shaft
   a) One b) Two
   c) Three d) Four
2) The volume of air delivered by compressor is called
   a) Swept Volume b) Free Air Delivery
   c) Compressor Capacity d) efficiency
3) Barometer is used to measure
   a) Pressure b) Temperature
   c) Electrical Energy d) Force
4) Constant Volume Process is also known as
   a) Isentropic Process b) Isobaric Process
   c) Isothermal Process d) Isochoric Process
5) $PV^n$=C represents Constant Temperature Process, when the value of n is
   a) n b) 0
   c) ϒ d) 1
6) Which one is the accessory of the boiler?
   a) Steam Injector b) Fusible plug
   c) Pressure Gauge d) Blow of cock
7) During refrigeration cycle, heat is absorbed by refrigerant in
   a) Compressor b) Evaporator
   c) Condenser d) Expansion Valve
8) When value of x>1 then the quality of steam is
   a) Wet steam b) Superheated steam
   c) Dry Saturated Steam d) None of these
9) Which is not a part of Vapour compression refrigeration system?
   a) Compressor b) Throttle valve
   c) Receiver d) Absorber
10) At high altitude, the compressor will draw
   a) More power b) Same power
   c) less power d) None of these

11) Priming is necessary in
a) Centrifugal pump b) Vapour Compression refrigeration system
c) 4-Stroke Diesel Engine d) Babcock Wilcox boiler

12) Which one is the water tube boiler?
a) Cochran Boiler b) Lancashire Boiler
c) Locomotive Boiler d) Babcock Wilcox boiler

13) Carburetor is used to supply
a) Diesel and Air Mixture b) Petrol and Air mixture
c) Diesel only d) Petrol only

14) Which one is correct?
a) PV=mRT b)$PV=C_v(\gamma-1)mT$
c) $P/\rho=RT$ d) All above

**Q.2** **(a)** Explain Isothermal Process. For Isothermal process. Find expression of work done, Change in Internal Energy, Change in Enthalpy and Heat transfer. **07**

**(b)** Calculate the heat required to form 2.5 kg dry steam at 1.1 MPa from water at $20^oC$. Determine the amount of heat removed at constant pressure to cause the steam to become 0.95 dry. Calculate the specific volume at respective condition. **07**

**Q.3** **(a)** Explain Carnot cycle and derive expression for the efficiency of the Carnot cycle. **07**

**(b)** An Otto cycle having compression ratio 8 has pressure and temperature at the beginning of compression are 1 bar and $27^0C$ respectively. If heat transfer per cycle is 1900KJ/Kg, find pressure and temperature at the end of each process. Take $C_V$=0.718 KJ/Kg-K. **07**

**Q.4** **(a)** List out Boiler mountings. **03**

**(b)** Explain fusible plug with neat sketch. **04**

**(c)** What is the main difference between water tube and fire tube boiler? Explain any one water tube boiler with neat sketch. **07**

**Q.5** **(a)** Explain four stroke Diesel Engine with neat sketch. **05**

**(b)** Differentiate between 2-stroke and 4-stroke cycle petrol engine. **03**

**(c)** The following data is available for 2-stroke diesel engine: **06**
Bore=10 cm, stroke=15 cm, engine speed=1000 RPM, Torque developed=58 N-m, $\eta_m$=80%, indicated thermal efficiency=40%, Calorific value of fuel=44000 KJ/Kg. Find: (a) Indicated Power,(b) Mean effective Pressure & (c) Brake Specific Fuel Consumption.

**Q.6** **(a)** What do you understand by word pump? Draw neat sketch of single acting reciprocating pump with nomenclature. **03**

**(b)** What should be the properties of common refrigerants? **05**

**(c)** What is the difference between ferrous and nonferrous materials? List out various ferrous and nonferrous materials with their application. **06**

**Q.7** **(a)** Differentiate between clutch and brake. **03**

**(b)** What are different elements to transfer motion and power? Explain any one with neat sketch. **04**

**(c)** What are the applications of compressor? Derive an expression of work done for single stage single acting reciprocating air compressor without clearance. **07**

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