

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:

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- | | | |
|----------------------|-------------------|-----------------------------|
| (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 | (12) Dryness fraction |
| (13) Efficiency | (14) Swept Volume | |

(b) Answer Following:

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- 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) γ
 - 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°C. 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°C 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**
