

**SILVER OAK COLLEGE OF ENGINEERING & TECHNOLOGY****ADITYA SILVER OAK INSTITUTE OF TECHNOLOGY****BE - SEMESTER-I • MID SEMESTER-I EXAMINATION – WINTER 2018****SUBJECT: BASIC MECHANICAL ENGINEERING (3110006) (CE/IT/ME/EC/CL/AE/EE)**

DATE: 09-10-2018

TIME: 02:00 pm to 03:30 pm

TOTAL MARKS:40

- Instructions:**
1. Q. 1 is compulsory.
  2. Figures to the right indicate full marks.
  3. Assume suitable data if required.

- Q.1 (a) Give Answer with most suitable/correct option. [05]
- (i) Which of the following is boiler mounting  
(a) Super heater (b) Air preheater  
(c) Economizer (d) Blow off co
  - (ii) An economizer in a boiler.....  
(a)Increases steam pressure (b)Increases steam flow  
(c) Decreases fuel consumption (d) Decreases steam pressure
  - (iii) A girl of mass 40 kg wears heels with an area of 1 cm<sup>2</sup> in contact with ground, pressure on ground is (take earth's gravitational field strength)\_\_\_\_\_ Pa  
(a)  $4 \times 10^{-5}$  (b)  $4 \times 10^4$  (c)  $4 \times 10^5$  (d)  $40 \times 10^5$
  - (iv) Amount of energy required to change liquid to gas and vice versa without any change in temperature is termed as  
(a)Latent Heat of Fusion (b) Latent Heat of Vaporization  
(c) Heat Capacity (d) Specific Heat Capacity
  - (v) Mathematical expression that describes Boyle's law is  
(a)  $PV = \text{constant}$  (b)  $V * \text{constant} = P$   
(c)  $P * \text{constant} = V$  (d)  $V/P = \text{constant}$
  - (b) Prove the equation of work done for Isothermal process. [05]

- Q.2 (a) With usual notations derive expression for air standard efficiency of Otto cycle. [06]
- (b) Determine the work done in compressing one kg of air from a volume of 0.15 m<sup>3</sup> at a pressure of 1 bar to a volume of 0.05 m<sup>3</sup>, when the compression is 1) adiabatic 2) isothermal. Take  $\gamma = 1.4$ . Give your comments. [05]
- (c) Draw air standard diesel cycle on p-V and T-s diagrams. [04]

**OR**

- Q.2 (a) Make comparison between vapour compression and vapour absorption system. [06]
- (b) The following readings were recorded during the test on single cylinder four stroke diesel engine. [05]
- (1)Cylinder diameter = 250 mm
  - (2) Stroke length = 350 mm
  - (3) Mean effective pressure = 6.7 bar
  - (4) Speed of engine = 250 r.p.m.
  - (5) Net brake load = 1070 N
  - (6) Effective brake drum diameter = 1.5 m
  - (7) Fuel consumption rate = 10 kg per hour.

(8) C.V. of the fuel = 44300 kJ/kg.

Calculate: (1) Indicated Power (2) Brake Power (3) Mechanical efficiency. (4) Brake thermal efficiency.

- (c) Define the following terms: (i) Prime mover, (ii) Force, (iii) Pressure, (iv) Temperature. [04]

Q.3 (a) Differentiate between Two stroke and Four stroke I.C engines. [06]

- (b) A six cylinder 4 stroke I.C. engine is to produce 95 kW brake power at 800 rpm. The stroke to bore ratio is 1.25, mean effective pressure is 7 bar. Determine the bore and stroke of the engine. Assume mechanical efficiency as 78%. [05]

- (c) Explain economizer and air-preheater with neat sketch. [04]

**OR**

Q.3 (a) Sketch and explain a Babcock and Wilcox boiler. [06]

- (b) Derive Meyer's equation. [05]

- (c) What do you understand by the term 1 ton of refrigeration? [04]  
What are the main components of vapour compression refrigeration system?
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