B. TECH. SEM - III (PRODUCTION ENGG.) (2014 COURSE)
(CBCS) : SUMMER - 2018

SUBJECT: APPLIED THERMODYNAMICS

Day: **Friday** Time: **02.30 PM TO 05.30 PM**
Date: **25/05/2018** **S-2018-2263** Max Marks: 60

N.B:

1) All questions are **COMPULSORY**.
2) Figures to the right indicate **FULL** marks.
3) Use of non- programmable **CALCULATOR** is allowed.
4) Use of steam table is allowed.
5) Assume suitable data if necessary.

Q.1 **a)** State the kelvin- Plank and Clausius statements of the second law of thermodynamics. **(04)**

b) Explain construction and working of economizer with heat sketch. **(06)**

OR

Q.2 **a)** A boiler raises 3.7 kg of water per kg of coal from feed water at 54.5^0c to steam at the pressure of 34 bar and temperature of 370^0c. Assuming specific heat of superheated steam as 2.6. Calculate equivalent evaporation / kg of coal. **(06)**

b) Explain heat engine, refrigerator & heat pump with neat sketch. **(04)**

Q.3 **a)** Explain construction and working of bell Coleman cycle with neat sketch. **(04)**

b) Explain sensible cooling and sensible heating with neat sketch. **(06)**

OR

Q.4 **a)** Explain winter air conditioning system with neat sketch. **(05)**

b) The temperature limits of an ammonia refrigerating system are 25^0c and -10^0c. If the gas is dry at the end end of compression calculate the coefficient of performance of the cycle assuming no undercooling of the liquid ammonia, use the following table for properties of ammonia.

Temperature (^{0}c)	Liquid heat (K J /kg)	Latent heat K J /kg	Liquid entropy K J /kg K
25	298.9	1166.94	1.1242
-10	135.37	1297.68	0.5443

Q.5 **a)** Explain construction and working of single stage reciprocating air compressor with neat sketch. **(05)**

b) Derive an expression for indicated work of a reciprocating air compressor by neglecting clearance. **(05)**

OR

Q.6 **a)** In a three- stage compressor air is compressed from 98 kPa to 20 bar calculate for 1 m^3 of air per second. **(06)**

i) Work under ideal condition for n= 1.3
ii) Isothermal work
iii) Saving in work due to multi staging

b) Define rotary compressor, classify them. **(04)**

Q.7 **a)** Explain air standard analysis with the help of assumptions. **(04)**

b) Determine the air standard efficiency of the diesel engine having a cylinder with a bore of 250 mm, a stroke of 375 mm with fuel cut off occurring at 5% of stroke. Assume γ= 1.4 **(06)**

OR

Q.8 **a)** Derive an expression for thermal efficiency of dual cycle. **(04)**

b) Give comparison of Otto , diesel , and dual cycle. **(06)**

Q.9 **a)** Explain the working of fuel injector with neat sketch. **(05)**

b) Explain splash lubrication system with neat sketch. **(05)**

Q.10 The following observations were recorded during a test on a single cylinder four stroke oil engine. Bore = 330 mm, stroke= 450 mm, speed= 300 rpm,imp= 6 bar, brake load= 1.5 KN. Brake drum diameter= 1.8 m. Brake rope diameter= 2cm. **(10)**

Calculate- i) Indicated power
ii) Brake power
iii) Mechanical efficiency

Q.11 **a)** Explain effectiveness and efficiency of a fin. **(05)**

b) Explain NTU method for parallel and counter flow heat exchanges. **(05)**

OR

Q.12 **a)** Give detailed classification of heat exchanger & explain it. **(05)**

b) Explain heat transfer through extended surfaces in detail. **(05)**

* * *