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NME401

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 140408

Roll No.

B. Tech.

(SEM. IV) THEORY EXAMINATION, 2014-15

APPLIED THERMODYNAMICS

Time : **3** Hours] [Total Marks : **100**

1 Attempt any four parts : **5×4=20**

(a) What is the difference between path function and point function, explain using p-v diagram. What is the work done in free expansion process ?

(b) Describe the steady flow energy equation for a single stream entering and leaving a control volume also explain the various terms involved. Give the differential from S.F.E.E. Also define unsteady flow process.

(c) What does the Clausius-Clapeyron equation signify ? Derive and discuss its applications.

(d) Define the following :

(i) Coefficient of volume expansion

(ii) Isothermal compressibility and

(iii) Adiabatic compressibility

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(e) How regeneration in gas turbines increases thermal efficiency of the plant ?

(f) Discuss the effect of temperature on standard heat of reaction.

2 Attempt any two questions : **10×2=20**

(a) What are boilers ? How are they classified ? Differentiate between mounting and accessories.

(b) What do you understand by boiler draught ? Calculate condition for maximum discharge.

(c) Determine equivalent evaporation/kg of fuel and boiler efficiency of a boiler having steam generation at 3 mpa, $350^{o}C$ at a rate of 4×10^{4} kg/hr. Feed water enters economizer at $100^{o}C$ and during one hour test 5×10^{3} kg fuel of Cv = 3.5×10^{4} kj/kg is consumed.

3 Attempt any two questions : **10×2=20**

(a) Draw P-V and T-S diagram for a Rankine cycle. Derive expression for work done and efficiency of cycle. Explain how it is different from modified Rankine cycle.

(b) Dry saturated steam at pressure of 6 bar flows through converdiver nozzle at rate of 4.5 kg/sec and exit pressure as 1.6 bar loss due to friction occurs in divergent section at 12% as friction drop. Determine cross section of exit and throat area.

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(c) Explain the following :

(i) Saturation curve

(ii) Indicated power

(iii) Metastable state flow through nozzle

(iv) Brake power

(v) Missing quantity

4 Attempt any two questions : **10×2=20**

(a) (i) Enumerate effect of pressure and temp. on Rankine cycle.

(ii) What is bleeding and how does it affects cycle efficiency ?

(b) Draw velocity diagram for velocity compounded turbine and find equation for maximum work done and efficiency.

(c) Define steam turbines and classify them. Explain the term compounding and its types in brief.

5 Attempt any two questions : **10×2=20**

(a) Explain in brief methods of improving efficiency of open cycle gas turbine.

(b) Explain Brayton cycle and obtain expression for efficiency in terms of pressure and temp ratio.

(c) Explain working of jet propulsion system and compare working of Ram jet with Pulse jet engines.