Code No: 07A3EC21 $\boxed{\textbf{R07}}$ $\boxed{\textbf{Set No. 2}}$

II B.Tech I Semester Examinations,MAY 2011
THERMAL SCIENCE
Common to Mechatronics, Production Engineering

Time: 3 hours Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks
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1. (a) Enumerate the applications of Joule's cycle.

    (b) Show with the help of diagrams the differences between theoretical and actual vapour compression cycles. [10+6]

2. (a) Describe with a neat sketch the working principles of Magneto-ignition system.

    (b) What are the advantages and limitations of battery ignition system over Magneto-ignition system. [8+8]

3. (a) Explain the effect of isentropic efficiency of turbine and compressor on the work output of gas turbine cycle.

    (b) Derive the thermal efficiency of gas turbine unit with multi stage compression with intercooling and multistage expansion with reheating. [8+8]

4. (a) Why lubrication system is required in I. C. Engines? Explain one of the lubrication system.

    (b) What are the limitations of simple carburetor? How to avoid those limitations. [8+8]

5. What is the basic difference between an otto cycle and Diesel cycle? Derive the expression for the efficiency and mean effective pressure of the Diesel cycle. [8+8]

6. A turbine operates under steady flow conditions, receiving steam at the following state: pressure 1.2 Mpa, temperature 188^0C, enthalpy 2785 KJ/kg, velocity 33.3 m/sec and elevation 3m. The steam leaves, the turbine at the following state: pressure 20 kpa, enthalpy 2512kJ/kg, velocity 100 m /sec and elevation 0m. Heat is lost to the surroundings at the rate of 0.29kJ/sec. If the rate of steam flow through the turbine is 0.42 kg/sec, what is the power output of the turbine in KW? [16]

7. (a) Draw neatly the sequences of operation of carnot engine on P-V and T-S diagrams. Show that the entropy charge during the cycle is zero.

    (b) State and prove clausius in equlity. [8+8]

8. (a) A non-flow reversible (quasi-static) process can be written down by an equation $(p = v^2 + \frac{8}{v})$ bar. Determine the work done if the volume changes from $1m^3$ to $3m^3$.

    (b) With an example explain the concept of a cyclic process.

    (c) What is meant by boundary of a system? [8+8]

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Set No. 2

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R07 **Set No. 4**

II B.Tech I Semester Examinations,MAY 2011
THERMAL SCIENCE
Common to Mechatronics, Production Engineering
Time: 3 hours   Max Marks: 80
Answer any FIVE Questions
All Questions carry equal marks
$\star\star\star\star\star$

1. (a) Why lubrication system is required in I. C. Engines? Explain one of the lubrication system.

   (b) What are the limitations of simple carburetor? How to avoid those limitations.
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2. (a) Enumerate the applications of Joule's cycle.

   (b) Show with the help of diagrams the differences between theoretical and actual vapour compression cycles. [10+6]

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   (b) With an example explain the concept of a cyclic process.

   (c) What is meant by boundary of a system? [8+8]

4. (a) Draw neatly the sequences of operation of carnot engine on P-V and T-S diagrams. Show that the entropy charge during the cycle is zero.

   (b) State and prove clausius in equlity. [8+8]

5. (a) Explain the effect of isentropic efficiency of turbine and compressor on the work output of gas turbine cycle.

   (b) Derive the thermal efficiency of gas turbine unit with multi stage compression with intercooling and multistage expansion with reheating. [8+8]

6. A turbine operates under steady flow conditions, receiving steam at the following state: pressure 1.2 Mpa, temperature 188^0C, enthalpy 2785 KJ/kg, velocity 33.3 m/sec and elevation 3m. The steam leaves, the turbine at the following state: pressure 20 kpa, enthalpy 2512kJ/kg, velocity 100 m /sec and elevation 0m. Heat is lost to the surroundings at the rate of 0.29kJ/sec. If the rate of steam flow through the turbine is 0.42 kg/sec, what is the power output of the turbine in KW?
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7. What is the basic difference between an otto cycle and Diesel cycle? Derive the expression for the efficiency and mean effective pressure of the Diesel cycle. [8+8]

8. (a) Describe with a neat sketch the working principles of Magneto-ignition system.

   (b) What are the advantages and limitations of battery ignition system over Magneto-ignition system. [8+8]

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R07

Set No. 1

II B.Tech I Semester Examinations,MAY 2011
THERMAL SCIENCE
Common to Mechatronics, Production Engineering
Time: 3 hours
Max Marks: 80
Answer any FIVE Questions
All Questions carry equal marks
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   (b) Show with the help of diagrams the differences between theoretical and actual vapour compression cycles. [10+6]

2. (a) Draw neatly the sequences of operation of carnot engine on P-V and T-S diagrams. Show that the entropy charge during the cycle is zero.
   (b) State and prove clausius in equlity. [8+8]

3. (a) A non-flow reversible (quasi-static) process can be written down by an equation $(p = v^2 + \frac{8}{v})$ bar. Determine the work done if the volume changes from $1m^3$ to $3m^3$.
   (b) With an example explain the concept of a cyclic process.
   (c) What is meant by boundary of a system? [8+8]

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   (b) What are the advantages and limitations of battery ignition system over Magneto-ignition system. [8+8]

6. (a) Explain the effect of isentropic efficiency of turbine and compressor on the work output of gas turbine cycle.
   (b) Derive the thermal efficiency of gas turbine unit with multi stage compression with intercooling and multistage expansion with reheating. [8+8]

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Set No. 1

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R07 **Set No. 3**

II B.Tech I Semester Examinations,MAY 2011
THERMAL SCIENCE
Common to Mechatronics, Production Engineering

Time: 3 hours Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks
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1. (a) Enumerate the applications of Joule's cycle.

   (b) Show with the help of diagrams the differences between theoretical and actual vapour compression cycles. [10+6]

2. What is the basic difference between an otto cycle and Diesel cycle? Derive the expression for the efficiency and mean effective pressure of the Diesel cycle. [8+8]

3. (a) A non-flow reversible (quasi-static) process can be written down by an equation $(p = v^2 + \frac{8}{v})$ bar. Determine the work done if the volume changes from $1m^3$ to $3m^3$.

   (b) With an example explain the concept of a cyclic process.

   (c) What is meant by boundary of a system? [8+8]

4. (a) Why lubrication system is required in I. C. Engines? Explain one of the lubrication system.

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   (b) What are the advantages and limitations of battery ignition system over Magneto-ignition system. [8+8]

6. A turbine operates under steady flow conditions, receiving steam at the following state: pressure 1.2 Mpa, temperature 188^0C, enthalpy 2785 KJ/kg, velocity 33.3 m/sec and elevation 3m. The steam leaves, the turbine at the following state: pressure 20 kpa, enthalpy 2512kJ/kg, velocity 100 m /sec and elevation 0m. Heat is lost to the surroundings at the rate of 0.29kJ/sec. If the rate of steam flow through the turbine is 0.42 kg/sec, what is the power output of the turbine in KW? [16]

7. (a) Draw neatly the sequences of operation of carnot engine on P-V and T-S diagrams. Show that the entropy charge during the cycle is zero.

   (b) State and prove clausius in equlity. [8+8]

8. (a) Explain the effect of isentropic efficiency of turbine and compressor on the work output of gas turbine cycle.

   (b) Derive the thermal efficiency of gas turbine unit with multi stage compression with intercooling and multistage expansion with reheating. [8+8]

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R07

Set No. 3

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