Code No: R05211401 **R05** **Set No. 2**

II B.Tech I Semester Examinations,November 2010
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) How the I.C engines are classified based on type of ignition, explain.
   (b) List out the differences between SI and CI engines. [8+8]

2. (a) With a schematic representation explain briefly about heat engine, refrigerator and heat pump
   (b) Define COP of a refrigerator
   (c) A certain machine works on reversed car not cycle between the temperature limits of -8^0C and 25^0C. Find its COP when working as [9+1+6]
      i. A refrigerating machine
      ii. Heat pump and efficiency when working as heat engine.

3. (a) What is a quasi-static process? What are its characteristic features
   (b) If a gas of volume 6000 cm^3 and at a pressure of 100 KPa is compressed quasistatically according to PV^2 = constant until the volume becomes 200 cm^3, determine the final pressure and the work transfer. [8+8]

4. A fluid is contained in a cylinder by a spring loaded, frictionless piston so that the pressure in the fluid is linear function of volume (p = a+bv). The internal energy of the fluid in kJ is given by the expression u = 32 + 3pv, where p is in kPa and v is in m^3. The initial and final pressures are 150 KPa and 350 KPa and the corresponding volumes are $0.02m^3$and $0.05m^3$. Make calculations for the direction and magnitude of work and heat interactions. [16]

5. (a) How to achieve rich fuel air mixture in S.I. Engine. Under what operating conditions rich mixture is required.
   (b) Describe the effect of different operating parameters on ignition delay in C.I. Engine combustion. [8+8]

6. (a) Differentiate between the gas turbine units and I.C. Engines.
   (b) Draw the schematic layout of gas turbine cycle with intercooling, reheating and regeneration. Explain the working along with T-s and p-V diagrams. [8+8]

7. (a) Discuss by mean of graphs the variation of air standard efficiency of Otto cycle with compression ratio and adiabatic index or ratio of specific heat?
   (b) A diesel engine has a compression ratio of 14 and cut off takes place at 6% of the stroke. Find the air standard efficiency. [8+8]

8. In an ammonia vapour compression system, the pressure in the evaporator is 2 bar. Ammonia at exit is 0.85 dry and at entry its dryness fraction is 0.19. During compression, the work done per kg of ammonia is 150 kJ. Calculate the C.O.P. and volume of vapour entering the compressor per minute, if the rate of ammonia circulation is 4,5 kg / min. the latent heat and specific volume at 2 bar are 1325 kJ / kg and 0.58 m^3 / kg respectively. [16]

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Code No: R05211401 **R05** **Set No. 4**

II B.Tech I Semester Examinations,November 2010
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) Discuss by mean of graphs the variation of air standard efficiency of Otto cycle with compression ratio and adiabatic index or ratio of specific heat?
   (b) A diesel engine has a compression ratio of 14 and cut off takes place at 6% of the stroke. Find the air standard efficiency. [8+8]

2. In an ammonia vapour compression system, the pressure in the evaporator is 2 bar. Ammonia at exit is 0.85 dry and at entry its dryness fraction is 0.19. During compression, the work done per kg of ammonia is 150 kJ. Calculate the C.O.P. and volume of vapour entering the compressor per minute, if the rate of ammonia circulation is 4,5 kg / min. the latent heat and specific volume at 2 bar are 1325 kJ / kg and 0.58 m^3 / kg respectively. [16]

3. (a) How the I.C engines are classified based on type of ignition, explain.
   (b) List out the differences between SI and CI engines. [8+8]

4. (a) Differentiate between the gas turbine units and I.C. Engines.
   (b) Draw the schematic layout of gas turbine cycle with intercooling, reheating and regeneration. Explain the working along with T-s and p-V diagrams. [8+8]

5. (a) How to achieve rich fuel air mixture in S.I. Engine. Under what operating conditions rich mixture is required.
   (b) Describe the effect of different operating parameters on ignition delay in C.I. Engine combustion. [8+8]

6. A fluid is contained in a cylinder by a spring loaded, frictionless piston so that the pressure in the fluid is linear function of volume (p = a+bv). The internal energy of the fluid in kJ is given by the expression u = 32 + 3pv, where p is in kPa and v is in m^3. The initial and final pressures are 150 KPa and 350 KPa and the corresponding volumes are $0.02m^3$and $0.05m^3$. Make calculations for the direction and magnitude of work and heat interactions. [16]

7. (a) What is a quasi-static process? What are its characteristic features
   (b) If a gas of volume 6000 cm^3 and at a pressure of 100 KPa is compressed quasistatically according to PV^2 = constant until the volume becomes 200 cm^3, determine the final pressure and the work transfer. [8+8]

8. (a) With a schematic representation explain briefly about heat engine, refrigerator and heat pump

(b) Define COP of a refrigerator

(c) A certain machine works on reversed car not cycle between the temperature limits of -8^0C and 25^0C. Find its COP when working as [9+1+6]

i. A refrigerating machine

ii. Heat pump and efficiency when working as heat engine.

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Code No: R05211401 **R05** **Set No. 1**

II B.Tech I Semester Examinations,November 2010
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) Differentiate between the gas turbine units and I.C. Engines.
   (b) Draw the schematic layout of gas turbine cycle with intercooling, reheating and regeneration. Explain the working along with T-s and p-V diagrams. [8+8]

2. (a) Discuss by mean of graphs the variation of air standard efficiency of Otto cycle with compression ratio and adiabatic index or ratio of specific heat?
   (b) A diesel engine has a compression ratio of 14 and cut off takes place at 6% of the stroke. Find the air standard efficiency. [8+8]

3. (a) With a schematic representation explain briefly about heat engine, refrigerator and heat pump
   (b) Define COP of a refrigerator
   (c) A certain machine works on reversed car not cycle between the temperature limits of -8^0C and 25^0C. Find its COP when working as [9+1+6]
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   (b) Describe the effect of different operating parameters on ignition delay in C.I. Engine combustion. [8+8]

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circulation is 4,5 kg / min. the latent heat and specific volume at 2 bar are 1325 kJ / kg and 0.58 m^3 / kg respectively. [16]

8. (a) What is a quasi-static process? What are its characteristic features

   (b) If a gas of volume 6000 cm^3 and at a pressure of 100 KPa is compressed quasistatically according to PV^2 = constant until the volume becomes 200 cm^3, determine the final pressure and the work transfer. [8+8]

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Code No: R05211401 **R05** **Set No. 3**

II B.Tech I Semester Examinations,November 2010
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) With a schematic representation explain briefly about heat engine, refrigerator and heat pump
   (b) Define COP of a refrigerator
   (c) A certain machine works on reversed car not cycle between the temperature limits of -8^0C and 25^0C. Find its COP when working as [9+1+6]
      i. A refrigerating machine
      ii. Heat pump and efficiency when working as heat engine.

2. In an ammonia vapour compression system, the pressure in the evaporator is 2 bar. Ammonia at exit is 0.85 dry and at entry its dryness fraction is 0.19. During compression, the work done per kg of ammonia is 150 kJ. Calculate the C.O.P. and volume of vapour entering the compressor per minute, if the rate of ammonia circulation is 4,5 kg / min. the latent heat and specific volume at 2 bar are 1325 kJ / kg and 0.58 m^3 / kg respectively. [16]

3. (a) What is a quasi-static process? What are its characteristic features
   (b) If a gas of volume 6000 cm^3 and at a pressure of 100 KPa is compressed quasistatically according to PV^2 = constant until the volume becomes 200 cm^3, determine the final pressure and the work transfer. [8+8]

4. (a) How the I.C engines are classified based on type of ignition, explain.
   (b) List out the differences between SI and CI engines. [8+8]

5. A fluid is contained in a cylinder by a spring loaded, frictionless piston so that the pressure in the fluid is linear function of volume (p = a+bv). The internal energy of the fluid in kJ is given by the expression u = 32 + 3pv, where p is in kPa and v is in m^3. The initial and final pressures are 150 KPa and 350 KPa and the corresponding volumes are $0.02m^3$and $0.05m^3$. Make calculations for the direction and magnitude of work and heat interactions. [16]

6. (a) Discuss by mean of graphs the variation of air standard efficiency of Otto cycle with compression ratio and adiabatic index or ratio of specific heat?
   (b) A diesel engine has a compression ratio of 14 and cut off takes place at 6% of the stroke. Find the air standard efficiency. [8+8]

7. (a) How to achieve rich fuel air mixture in S.I. Engine. Under what operating conditions rich mixture is required.

(b) Describe the effect of different operating parameters on ignition delay in C.I. Engine combustion. [8+8]

8. (a) Differentiate between the gas turbine units and I.C. Engines.

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