

Code No: 07A4EC05

R07**Set No. 2**

II B.Tech II Semester Examinations, APRIL 2011

THERMAL ENGINEERING - I

Common to Mechanical Engineering, Automobile Engineering

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions

All Questions carry equal marks

1. (a) Draw the velocity triangles for the centrifugal compressor and derive the equation for the estimation of power required to compress the air.
(b) What are the function of lobes in Roots blower? Explain the working. [8+8]
2. (a) Name the various measurements which are to be taken in a test of an I.C. engine?
(b) An engine is used on a job requiring 110 kW B.P, the mechanical efficiency of the engine is 80 % and the engine used 50 kg fuel per hour under the conditions of operation. A design improvement is made which reduces the engine friction by 5 kW. Assuming the indicated thermal efficiency remains the same, how many kg of fuel per hour will be saved. [6+10]
3. Explain swirl chamber, pre-combustion chamber, and air-cell combustion chamber in CI Engines. [16]
4. (a) Clearly explain the various wet sump lubrication systems?
(b) Compare wet sump and dry sump lubrication systems? [10+6]
5. Explain different methods to achieve smooth engine operation in SI engines? [16]
6. (a) Derive the equation for the work required to compress the air to the desired pressure in axial compressor.
(b) An axial flow compressor with compression ratio of 5, draws air at 20⁰C and delivers it at 50⁰C. Assuming 50% degree of reaction, find the velocity of flow if the blade velocity is 100 m/s. Also find the number of stages if work factor = 0.85, $\alpha = 10^0$, $\beta = 40^0$ and $C_p = 1.005$ kJ/kg K. [8+8]
7. (a) Derive an expression for the shaft work of reciprocating air compressor assuming zero clearance volume.
(b) Determine the minimum amount of work required to compress the unit of mass of air from 1 bar 288 K to 40 bar, if the law of compression is $p^{V^{1.25}} = \text{Const}$ in a two stage compressor with perfect inter cooling by neglecting the clearance. [6+10]
8. (a) What are different factors affecting knock in SI engine?
(b) What are knocking limited parameters in SI engine? [8+8]

Code No: 07A4EC05

R07**Set No. 4**

II B.Tech II Semester Examinations, APRIL 2011

THERMAL ENGINEERING - I

Common to Mechanical Engineering, Automobile Engineering

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions

All Questions carry equal marks

1. Explain swirl chamber, pre-combustion chamber, and air-cell combustion chamber in CI Engines. [16]
2. Explain different methods to achieve smooth engine operation in SI engines? [16]
3. (a) What are different factors affecting knock in SI engine?
(b) What are knocking limited parameters in SI engine? [8+8]
4. (a) Derive the equation for the work required to compress the air to the desired pressure in axial compressor.
(b) An axial flow compressor with compression ratio of 5, draws air at 20°C and delivers it at 50°C. Assuming 50% degree of reaction, find the velocity of flow if the blade velocity is 100 m/s. Also find the number of stages if work factor = 0.85, $\alpha = 10^\circ$, $\beta = 40^\circ$ and $C_p = 1.005$ kJ/kg K. [8+8]
5. (a) Name the various measurements which are to be taken in a test of an I.C. engine?
(b) An engine is used on a job requiring 110 kW B.P., the mechanical efficiency of the engine is 80 % and the engine used 50 kg fuel per hour under the conditions of operation. A design improvement is made which reduces the engine friction by 5 kW. Assuming the indicated thermal efficiency remains the same, how many kg of fuel per hour will be saved. [6+10]
6. (a) Draw the velocity triangles for the centrifugal compressor and derive the equation for the estimation of power required to compress the air.
(b) What are the function of lobes in Roots blower? Explain the working. [8+8]
7. (a) Clearly explain the various wet sump lubrication systems?
(b) Compare wet sump and dry sump lubrication systems? [10+6]
8. (a) Derive an expression for the shaft work of reciprocating air compressor assuming zero clearance volume.
(b) Determine the minimum amount of work required to compress the unit of mass of air from 1 bar 288 K to 40 bar, if the law of compression is $p^{V^{1.25}} = \text{Const}$ in a two stage compressor with perfect inter cooling by neglecting the clearance. [6+10]

Code No: 07A4EC05

R07**Set No. 1**

II B.Tech II Semester Examinations, APRIL 2011

THERMAL ENGINEERING - I

Common to Mechanical Engineering, Automobile Engineering

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions

All Questions carry equal marks

1. (a) Derive an expression for the shaft work of reciprocating air compressor assuming zero clearance volume.
- (b) Determine the minimum amount of work required to compress the unit of mass of air from 1 bar 288 K to 40 bar, if the law of compression is $p^{V^{1.25}} = \text{Const}$ in a two stage compressor with perfect inter cooling by neglecting the clearance. [6+10]
2. (a) Name the various measurements which are to be taken in a test of an I.C. engine?
- (b) An engine is used on a job requiring 110 kW B.P., the mechanical efficiency of the engine is 80 % and the engine used 50 kg fuel per hour under the conditions of operation. A design improvement is made which reduces the engine friction by 5 kW. Assuming the indicated thermal efficiency remains the same, how many kg of fuel per hour will be saved. [6+10]
3. Explain different methods to achieve smooth engine operation in SI engines? [16]
4. (a) Draw the velocity triangles for the centrifugal compressor and derive the equation for the estimation of power required to compress the air.
- (b) What are the function of lobes in Roots blower? Explain the working. [8+8]
5. (a) Derive the equation for the work required to compress the air to the desired pressure in axial compressor.
- (b) An axial flow compressor with compression ratio of 5, draws air at 20°C and delivers it at 50°C. Assuming 50% degree of reaction, find the velocity of flow if the blade velocity is 100 m/s. Also find the number of stages if work factor = 0.85, $\alpha = 10^\circ$, $\beta = 40^\circ$ and $C_p = 1.005 \text{ kJ/kg K}$. [8+8]
6. Explain swirl chamber, pre-combustion chamber, and air-cell combustion chamber in CI Engines. [16]
7. (a) What are different factors affecting knock in SI engine?
- (b) What are knocking limited parameters in SI engine? [8+8]
8. (a) Clearly explain the various wet sump lubrication systems?
- (b) Compare wet sump and dry sump lubrication systems? [10+6]

Code No: 07A4EC05

R07**Set No. 3**

II B.Tech II Semester Examinations, APRIL 2011

THERMAL ENGINEERING - I

Common to Mechanical Engineering, Automobile Engineering

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions

All Questions carry equal marks

1. (a) What are different factors affecting knock in SI engine?
(b) What are knocking limited parameters in SI engine? [8+8]
2. (a) Clearly explain the various wet sump lubrication systems?
(b) Compare wet sump and dry sump lubrication systems? [10+6]
3. (a) Derive an expression for the shaft work of reciprocating air compressor assuming zero clearance volume.
(b) Determine the minimum amount of work required to compress the unit of mass of air from 1 bar 288 K to 40 bar, if the law of compression is $p^{V1.25} = \text{Const}$ in a two stage compressor with perfect inter cooling by neglecting the clearance. [6+10]
4. Explain swirl chamber, pre-combustion chamber, and air-cell combustion chamber in CI Engines. [16]
5. (a) Draw the velocity triangles for the centrifugal compressor and derive the equation for the estimation of power required to compress the air.
(b) What are the function of lobes in Roots blower? Explain the working. [8+8]
6. Explain different methods to achieve smooth engine operation in SI engines? [16]
7. (a) Derive the equation for the work required to compress the air to the desired pressure in axial compressor.
(b) An axial flow compressor with compression ratio of 5, draws air at 20°C and delivers it at 50°C. Assuming 50% degree of reaction, find the velocity of flow if the blade velocity is 100 m/s. Also find the number of stages if work factor = 0.85, $\alpha = 10^\circ$, $\beta = 40^\circ$ and $C_p = 1.005$ kJ/kg K. [8+8]
8. (a) Name the various measurements which are to be taken in a test of an I.C. engine?
(b) An engine is used on a job requiring 110 kW B.P., the mechanical efficiency of the engine is 80 % and the engine used 50 kg fuel per hour under the conditions of operation. A design improvement is made which reduces the engine friction by 5 kW. Assuming the indicated thermal efficiency remains the same, how many kg of fuel per hour will be saved. [6+10]
