

# AR16

Code No: 16MTE1002 SET-1  
ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI  
(AUTONOMOUS)  
I M.Tech I Semester Regular Examinations, January-2017

## ADVANCED THERMODYNAMICS (Thermal Engineering)

Time: 3 hours

Max Marks: 60

Answer any FIVE questions  
All questions carry equal marks

1. (a) The Latent heat of fusion of water at  $0^{\circ}\text{C}$  is 335 KJ/Kg. How much does the entropy of 1 kg of ice change as it melts into water in each of the following ways: 6
  - (i) Heat is supplied reversibly to a mixture of ice and water at  $0^{\circ}\text{C}$ .
  - (ii) A mixture of ice and water at  $0^{\circ}\text{C}$  is stirred by a paddle wheel.
  
- (b) Air enters an adiabatic compressor at atmospheric conditions of 1 bar,  $15^{\circ}\text{C}$  and leaves at 5.5 bar. The mass flow rate is 0.01 kg/s and the efficiency of the compressor is 75%. After leaving the compressor, the air is cooled to  $40^{\circ}\text{C}$  in an aftercooler. Calculate (i) the power required to drive the compressor (ii) the rate of irreversibility for the overall process (compressor and cooler) 6
  
2. (a) Explain Clausius Clapeyron Equation. 8  
(b) Write Maxwell Relations 4
  
3. (a) What is the Van't Hoff equation? 3  
(b) Octane gas ( $\text{C}_8\text{H}_{18}$ ) at  $25^{\circ}\text{C}$  is burned steadily with 80 percent excess air at  $25^{\circ}\text{C}$ , 1 atm and 40 percent relative humidity. Assuming combustion is complete and the products leave the combustion chamber at 1000K, determine the heat transfer for this process per unit mass of octane. 9

4. (a) What is the difference between cogeneration and regeneration? 3  
 (b) Steam is generated in the boiler of a cogeneration plant at 10Mpa and 450°C at a steady rate of 5 Kg/s. In normal operation, steam expands in a turbine to a pressure of 0.5MPa and is then routed to the process heater, Where it supplies the process heat. Steam leaves the process heater as a saturated liquid and is pumped to the boiler pressure. In this mode, no steam passes through the condenser which operates at 20 KPa.  
 (i) Determine the power produced and the rate at which process heat is supplied in this mode.  
 (ii) Determine the power produced and the rate of process heat supplied if only 60 percent of the steam is routed to the process heater and the remainder is expanded to the condenser pressure.
5. (a) (i) Derive the equation  $c_p = T \left( \frac{\partial v}{\partial T} \right)_p \left( \frac{\partial p}{\partial T} \right)_s$  6  
 (ii) Derive the equation  $c_v = T \left( \frac{\partial p}{\partial T} \right)_v \left( \frac{\partial v}{\partial T} \right)_s$   
 (b) Using the cyclic equation, Prove that  $\left( \frac{\partial p}{\partial T} \right)_v = \frac{\beta}{\alpha T}$  6
6. (a) Explain the working of photovoltaic cells. 6  
 (b) Explain the working of magneto Hydrodynamic Generator. 6
7. (a) What is the basic difference between Thermoelectric and Thermionic conversion systems? 6  
 (b) What are the Merits and Demerits of direct energy conversion systems over conventional power generation systems? 6
8. (a) Explain the working of a Binary Vapour cycle. 6  
 (b) Explain Applicability of the phenomenological Relations 6

# AR16

**CODE: 16MVL1002** **SET-2**  
**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI**  
**(AUTONOMOUS)**  
**I M.Tech. I Semester Regular Examinations, January, 2017**

## **DIGITAL DESIGN THROUGH HDL** **(COMMON TO DECS & VLSI SYSTEM DESIGN)**

Time: 3 Hours

Max Marks: 60

Answer any FIVE questions  
All questions carry EQUAL marks

1. (a) With the help of neat sketches, illustrate the ASIC design flow in detail. 6 M  
(b) List and describe the data types used in Verilog HDL. 6 M
2. (a) Illustrate the operation of a byte comparator and prepare the Verilog code for the circuit using gate level modelling. 6 M  
(b) Show the verilog module to instantiate and test the AND gate primitive. 6 M
3. (a) Write a verilog module for a 2 x 4 decoder using a case statement. 6 M  
(b) Illustrate with an example module, the use of repeat construct in behavioural modelling. 6 M
4. (a) Mention the types of operators used in Verilog. Explain them in detail. 6 M  
(b) List and describe the types of compiler directives available in Verilog. 6 M
5. (a) Explain in detail about wait construct with an example. 6 M  
(b) Write short notes on intra-assignment delays and always construct. 6 M
6. (a) Summarize the features of file based tasks and functions. 6 M  
(b) Discuss the features of Mealy machine with the help of block diagram 6 M
7. (a) Describe in detail about the data objects used in VHDL. 6 M  
(b) Differentiate between concurrent and sequential signal assignment statements. 6 M
8. (a) Write a VHDL program for 9-bit parity generator using structural modelling. 6 M  
(b) Write brief notes on component instantiation and package declaration. 6 M

**Code: 16MPE1002****ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI  
(AUTONOMOUS)****I M.Tech I Semester Regular Examinations, January-2017****ANALYSIS OF POWER ELECTRONIC CONVERTERS****(Power Electronics and Drives)****Time: 3 Hours****Max Marks: 60****Answer any FIVE questions  
All questions carry EQUAL marks**

1.   a) Explain the operation of 3 phase AC voltage controller with star connected load   [6M]  
      b) Discuss the harmonics present in the output voltage of above converter?   [6M]
2.   a) Explain the extinction angle and symmetrical angle control of converter.   [6M]  
      b) Explain the operation of series converter.   [6M]
3.   a) Explain the operation of 12-pulse converter and show that how the 5<sup>th</sup> and 7<sup>th</sup> harmonics is eliminated   [6M]  
      b) For 3- $\phi$  full converter operating from 3- $\phi$ /415v/50Hz supply with resistive load, Determine the average output voltage for  $\alpha = 0^\circ, 30^\circ, 60^\circ$  and  $120^\circ$ .   [6M]
4.   a) Explain the operation of Boost regulator.   [6M]  
      b) Derive the necessary expressions for filter components for continuous current and voltage operation for Boost regulator?   [6M]
5.   Explain the following PWM control techniques for inverters.   [12M]
  - i. Single pulse width modulation.
  - ii. Multiple pulse width modulation.
  - iii. Sinusoidal pulse width modulation.
  - iv. Phase displacement control
6.   a) Explain the principle of operation of Diode-Clamped multilevel Inverter.   [6M]  
      b) What are the features of Diode-Clamped Inverters?   [6M]
7.   Explain the space vector PWM technique for following regions   [12M]
  - i. Linear (or ) Under modulation region.
  - ii. Over modulation region.
8.   a) For a single-phase full converter derive the expression for displacement factor?   [6M]  
      b) Explain why p.f. of semi converter is better than that of full converter?   [6M]

**DATABASE MANAGEMENT SYSTEMS  
COMPUTER SCIENCE ENGINEERING**

Time: 3 Hours

Max Marks:60

Answer any FIVE questions  
All questions carry EQUAL marks

1. (a) Explain the Transaction management in a database. (6M)  
(b) Discuss the Query Processor of Database system structure. (6M)
2. (a) What are the additional features of ER model. (6M)  
(b) Explain the difference between weak entity and strong entity sets? How to represent the strong and weak entity set through E-R diagrams. (6M)
3. (a) **Consider the following relational schema.** An employee can work in more than one department; the pct time field of the Works relation shows the percentage of time that a given employee works in a given department. **Emp**(eid: integer, ename: string, age: integer, salary: real) **Works**(eid: integer, did: integer, pct time: integer) **Dept**(did: integer, budget: real, managerid: integer) (6M)

**Write the following queries in SQL:**

- i) Print the names and ages of each employee who works in both the Hardware department and the Software department.
- ii) Print the name of each employee whose salary exceeds the budget of all of the departments that he or she works in.
- (b) What is a trigger? What are its three parts? Differentiate row-level and statement-level triggers. (6M)
4. (a) Differentiate between join dependency and multi-valued dependency. Give examples for join dependencies and multi-valued dependencies. (6M)  
(b) Contrast 3NF decomposition method with BCNF decomposition method illustratively. (6M)
5. (a) Consider a database with objects X and Y and assume that there are two transactions T1 and T2. Transaction T1 reads objects X and Y and then writes object X. Transaction T2 reads objects X and Y and then writes objects X and Y .  
i). Give an example schedule with actions of transactions T1 and T2 on objects X and Y that results in a write-read conflict.  
ii). Give an example schedule with actions of transactions T1 and T2 on objects X and Y that results in a read-write conflict. (6M)  
(b) Explain various types of lock based concurrency control with a neat sketch and examples. (6M)
6. (a) What is the minimum space utilization for a B+ tree index? (4M)  
(b) Differentiate between hash based indexing and tree based indexing with examples. (8M)
7. (a) What is a relational database query? Explain with an example. (6M)  
(b) Define join. Explain different types of joins. (6M)
8. (a) How do you implement atomicity and durability? Explain with an example? (6M)  
(b) Discuss in detail about the set operations of relational algebra and explain with examples. (6M)

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI  
(AUTONOMOUS)**

**I M.Tech I Semester Regular Examinations, January-2017**

**THEORY OF ELASTICITY AND PLASTICITY  
(STRUCTURAL ENGINEERING)**

Time: 3 Hours

Max Marks:60

Answer any FIVE questions  
All questions carry EQUAL marks

1. (a) Derive differential equations of equilibrium equations in terms of stress. 5M  
 (b) Derive the equations of Equilibrium in 2D case and also derive the expression to express components of stress as components of strain 7M
  
2. (a) Given the following stress function  $\phi = \frac{f}{d^2} xy^3 (3d - 2y)$  determine the stress and sketch their variation in the region  $y=0$ ;  $y=d$ ;  $x=0$  on the  $x$  is positive. 5M  
 (b) Determine the Saint – Venant’s principle 7M
  
3. (a) Obtain the radial and tangential normal stresses in polar coordinates on Considering a “hollow cylinder” under uniform pressure. 6M  
 (b) Derive the equations of the stress strain relation in polar coordinates. 6M
  
4. (a) Show that  $\phi = \frac{x}{\pi} r\theta \sin\theta$  is a stress function in a polar coordinate system. 6M  
 (b) Discuss the effect of a circular hole in stress distribution of plates. 6M
  
5. (a) Discuss the Castiglione’s theorem. 6M  
 (b) Explain the principle of virtual work 6M
  
6. (a) Explain stress ellipsoid and stress-director surface for 3-D systems 6M  
 (b) Derive strain-displacement relationships for 3-D Cartesian system of coordinates. 6M
  
7. (a) Derive the equation torsion of thin tubes or thin walled tubes. 6M  
 (b) Discuss the effect of shear and torsion for rolled profile sections 6M
  
8. (a) Derive the expression for torsion for prismatic bars 6M  
 (b) Determine the membrane analogy of torsion of rectangular bars 6M

## **THEORY OF ELASTICITY AND PLASTICITY**

**(STRUCTURAL ENGINEERING)**

**Time : 3 hours**

**Max Marks : 60**

**Answer any FIVE questions**

**All questions carry equal marks**

1. Derive the Rectangular stress components in 3-Dimensional and obtain the differential equations of equilibrium for three dimensions. [12M]
2. a) State and derive generalized hooks law [6M]  
b) Define Plane stress and plane strain conditions with examples. [6M]
3. Determine the stresses and displacements for Cantilever beam loaded with point load in the free end. [12M]
4. Derive the expressions for torsion of prismatic bars with elliptical cross-section. [12M]
5. Derive the governing differential equation for curved bars in terms of polar coordinates [12M]
6. Define Principal Stresses. Determine Cauchy's Stress function for determining principle stresses. [12M]
7. State and derive membrane analogy for torsion of rectangular bars. [12M]
8. Obtain Governing Differential Equation for plane problems, consider plane strain condition. [12M]

**Code No: 13MCS1002****ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI  
(AUTONOMOUS)****I M.Tech I Semester Supplementary Examinations, January - 2017****Computer Organization and Architecture  
(Computer Science and Engineering)****Time: 3 hours****Max Marks: 60****Answer any FIVE questions  
All questions carry equal marks**

1. a) Draw and explain the block diagram of a digital computer  
b) Explain the representation of fixed and floating point numbers. (6M+6M)
2. a) What is a stack? Explain the organization of a stack.  
b) Explain the properties of RISC Processor. (6M+6M)
3. a) Explain BOOTH'S Multiplication algorithm from the theoretical basis.  
b) Multiply 11101 and 10101 using Booth's algorithm. (6M+6M)
4. Explain the construction of semiconductor ROM and RAM memories. Also mention advantages and applications. (12M)
5. a) What is an Input-Output processor? Explain the need for Input-Output processor.  
b) Differentiate between programmed I/O and interrupt driven I/O. (6M+6M)
6. Explain the following  
a) RISC Pipeline  
b) Vector Processing (6M+6M)
7. a) What is parallel processing? Explain the types of parallel processor systems.  
b) What is cache coherence? Explain. (6M+6M)
8. Write Short Notes  
a) Direct memory Access Controller  
b) Interconnected (PCI) bus (6M+6M)

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