

**ADVANCED FLUID MECHANICS  
(Thermal Engineering)****Time : 3 Hours****Max Marks: 60****Answer any FIVE questions  
All questions carry equal Marks**

1. (a) Briefly discuss about the following [6M]
  - (i) Lagrangian and Eulerian approaches of studying fluid flow problems.
  - (ii) Velocity potential and Stream function
- (b) The velocity potential function ( $\phi$ ) is given by an expression [6M]
$$\phi = -\frac{xy^3}{3} - x^2 + \frac{x^3y}{3} + y^2$$
  - (i) Find the velocity components in x and y direction.
  - (ii) Show that  $\phi$  represents a possible case of flow and derive an expression for stream function ( $\psi$ )
2. (a) Derive 3-dimensional, continuity equation for steady, incompressible fluid flow. [8M]
- (b) Define and Derive Local & Convection accelerations for fluid flow problems. [4M]
3. State impulse momentum principle and derive impulse momentum equation applied to fluid flows. [12M]
4. Derive the expressions for Shear stress and Velocity distribution for viscous laminar flow through a pipe. [12M]
5. For the velocity profile for laminar boundary layer  $u/U = 3/2 (y/\delta) - 1/2 (y/\delta)^2$  Determine the boundary layer thickness, shear stress, drag force and co-efficient of drag in terms of Reynolds number. [12M]
6. A smooth pipe of diameter 80 mm and 800 m long carries water at the rate of 0.48 m<sup>3</sup>/min. Calculate the loss of head, wall shearing stress, centre line velocity, velocity and shear stress at 30 mm from pipe wall. Also calculate the thickness of laminar sub layer. Take kinematic viscosity of water as 0.015 stokes. Take the value of co-efficient of friction 'f' from the relation given as  $f = \frac{0.0791}{Re^{1/4}}$  where Re = Reynolds number. [12M]
7. (a) Derive the fundamental equations of continuity, energy equation for adiabatic process in the case of compressible fluid flow. [6M]
- (b) A gas with a velocity of 300 m/s is flowing through a horizontal pipe at a section where pressure is  $6 \times 10^4$  N/m<sup>2</sup> (absolute) and temperature 40<sup>0</sup> C. The pipe changes in diameter and at this section the pressure is  $9 \times 10^4$  N/m<sup>2</sup> (absolute). Find the velocity of the gas at this section if the flow of the gas is adiabatic. [6M]
8. (a) Discuss briefly the propagation of pressure waves (or disturbances) in a compressible fluid for different Mach number cases. [8M]
- (b) A projectile is travelling in air having pressure and temperature as 8.829 N/cm<sup>2</sup> and -2<sup>0</sup> C. If the Mach angle is 40<sup>0</sup>, find the velocity of the projectile. Take k = 1.4 and R = 287 J/kgK [4M]

# AR16

**CODE: 16MDE1002** **SET-2**  
**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI**  
**(AUTONOMOUS)**

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

**ANALOG AND DIGITAL IC DESIGN**  
**(Digital Electronics and Communication Systems)**

Time: 3 Hours

Max Marks:60

Answer any FIVE questions  
All questions carry EQUAL marks

1. (a) Investigate the low frequency model of a Source follower Amplifier and derive the expression for gain.  
(b) Analyze the small signal model of a MOS transistor in the active region at low frequencies and derive the expressions for trans-conductance, Body effect Conductance and finite output impedance.
2. (a) Draw and explain the dc voltage versus phase difference characteristic of balanced modulator phase detector of a PLL indicating all important regions.  
(b) List out the applications of PLL.
3. (a) Explain parasitic sensitive integrator with neat sketch  
(b) Design a resettable gain circuit and discuss how an op-amp offset voltage is cancelled.
4. (a) Discuss how a CMOS logic family can be interfaced with TTL family  
(b) Write a VHDL program for 4-bit ripple carry adder in structural modelling style.
5. (a) Design a 5 to 32 Decoder using 74X138 ICs.  
(b) Explain about internal structure of RAM with a neat sketch
6. (a) Explain the operation of a 3-bit flash A/D converter.  
(b) Discuss different performance limitations of data converters.
7. (a) Implement the following Boolean function and design a hardware realization.  
Write a VHDL program using data-flow model for the implementation.  
 $F(A, B, C, D) = \Sigma(5, 7, 13, 15)$   
(b) Discuss different modelling styles in VHDL.
8. (a) Design a 4-bit R-2R based D/A converter and derive the expression for output voltage.  
(b) Explain how a multi stage comparator is used to eliminate clock feed through errors.

# AR16

**Code No: 16MPE1004** **SET-1**  
**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI**  
**(AUTONOMOUS)**  
**I M.Tech I Semester Regular Examinations, January-2017**

## **MICROCONTROLLERS AND APPLICATIONS** **(Power Electronics and Drives)**

**Time: 3 Hours**

**Max Marks: 60**

**Answer any FIVE questions**  
**All questions carry EQUAL marks**

1. Draw the pin diagram of 8051 and explain the functioning of each and every pin in detail [12M]
2. (a) Explain different addressing modes of 8051 microcontroller using relevant example instructions. [8M]  
(b) Explain PSW register in 8051 microcontroller [4M]
3. What is an interrupt? Discuss the hardware and software attributes of vectored interrupts of 8051. [12M]
4. (a) Write a program to generate 2 KHz Square wave on pin P1.0 of port 1 of 8051, assume oscillator frequency as 12 KHz. [6M]  
(b) Write a program to generate Pulse wave on pin P1.0 of 89c2051bt INTO interrupt, assume oscillator frequency as 12 KHz. [6M]
5. Discuss interrupt structure in PIC microcontrollers. List various interrupt sources in PIC 1671. Write a program to enable all interrupts in PIC 1674. [12M]
6. (a) Explain the program memory of PIC 16F8XX microcontroller [6M]  
(b) Explain in detail various functional blocks of PIC 16F877 microcontroller. [6M]
7. (a) Explain ADC and DAC Interfacing with 89C51 Microcontrollers using relevant diagrams. [6M]  
(b) Discuss the selection criteria of ADC interfacing [6M]
8. Draw the diagram of digital PID controller and explain with neat flow chart. [12M]

**DIGITAL IC DESIGN  
(VLSI SYSTEM DESIGN)**

Time: 3 Hours

Max Marks:60

Answer any FIVE questions  
All questions carry EQUAL marks

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|----|-----|---|----|
| 1. | (a) | Explain the power and energy Consumption in an IC   | 6M |
|    | (b) | Explain the functionality of Robustness   | 6M |
| 2. | (a) | Explain about Channel length Modulation and velocity Saturation under static conditions               | 6M |
|    | (b) | Explain with diagram of CMOS Latch up   | 6M |
| 3. | (a) | What Happens when Scaling the supply voltage in an IC   | 6M |
|    | (b) | Explain briefly with diagrams of Gate –Drain Capacitance  | 6M |
| 4. | (a) | Explain the two Input LS-TTL NOR Gate with neat Sketches and write the functional table               | 6M |
|    | (b) | Write the VHDL Code for a 3-to-8 decoder using Behavioural style                                      | 6M |
| 5. | (a) | Explain the operation of 4 bit synchronous up counter with Functional table and sketches              | 6M |
|    | (b) | Write the VHDL Code for a 16 bit barrel shifter for left circular shifts only using Behavioural style | 6M |
| 6. | (a) | Explain the Internal ROM Structure showing use of control inputs                                      | 6M |
|    | (b) | Explain the timing parameters for write operations in a static RAM                                    | 6M |
| 7. | (a) | Explain the interconnections of 4*4 Barrel shifter  | 6M |
|    | (b) | Write the Comparisons of CPLD and FPGA  | 6M |
| 8. | (a) | Explain about Internal structure of RAM   | 6M |
|    | (b) | Explain the Architecture of XC9500 Configurable logic block   | 6M |

# AR16

**CODE: 16MCS1004**

**SET-1**

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

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

## **OPERATING SYSTEMS Computer Science Engineering**

Time: 3 Hours

Max Marks:60

Answer any FIVE questions  
All questions carry EQUAL marks

1.
  - i. What does the cut command do? Can you use it together with w to produce a list of login names and CPU times corresponding to each active process? Can you now (all on the same command line) use sort and head or tail to find the user whose process is using the most CPU? 12M
  - ii. Write a Grep command to search for a four letter word whose first letter is a 'b' and last letter 'k'.
  - iii. Create a file using cat and find the number of lines, words and characters in it.
  - iv. Change the file Access Date to older date for a group of files.
  - v. Create a Link for the file and display its **inode** number
  - vi. How can we concatenate the contents of two files and append them in the third File
2.
  - (a)
    - i. Write a program to Count the number of users who logged in and display the result. 6M
    - ii. Write a program to Calculate sum of two numbers using expr
  - (b)
    - i. Write an interactive shell script to search a pattern in the file 6M
    - ii. Write a shell script to read 10 numbers from the user and to find the sum and average of the numbers.
3.
  - (a)
    - i. To wait for the child process to finish, which system call should the parent process execute? 6M
    - ii. Write a system program that creates a Zombie
  - (b)
    - i. When the child process has to execute a command typed after a shell prompt by a user, what can the execve system call do? 6M
    - ii. Write a system program that creates a child using fork() system call
4. Consider the following page reference string: 12M  
7, 2, 3, 1, 2, 5, 3, 4, 6, 7, 7, 1, 0, 5, 4, 6, 2, 3, 0, 1.  
Assuming demand paging with three frames, how many page faults would occur for the following replacement algorithms?  
A.LRU replacement  
B.FIFO replacement
5.
  - (a) Explain how the VFS layer allows an operating system to support multiple types of file systems easily. 6M
  - (b) List and briefly define three file allocation methods. 6M
6.
  - (a) What are the two models of inter-process communication? What are the strengths and weaknesses of the two approaches? 6M
  - (b) Demonstrate the IPC mechanism using shared memory-oriented system calls. 6M
7.
  - (a) Illustrate the use of semaphore to solve the bounded buffer problem 6M
  - (b) Write a system program that shares a pipe between two processes? 6M
8. Discuss segmentation in detail. Compare it with paging. 12M

# AR16

**CODE: 16MSE1004**

**SET-2**

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

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

## **THEORY OF PLATES AND SHELLS**

**(Structural Engineering)**

Time: 3 Hours

Max Marks:60

Answer any FIVE questions  
All questions carry EQUAL marks

1. (a) What are the assumptions made in thin plates with small deflections? 4  
(b) Derive the equations of equilibrium for small deflections of laterally loaded plates? 8
2. Find Levy's solution for simply supported and uniformly loaded rectangular plates? 12
3. (a) Discuss the general theory of cylindrical shell loaded symmetrically with respect to its axis? 4  
(b) Compare membrane theory and bending theory of cylindrical shell in details? 8
4. Discuss the membrane theory of density curved shells and thus obtain the expression for membrane force along meridional and circumferential directions? 12
5. Obtain the expression for deflection in case of uniformly loaded circular plates with simply supported edges? 12
6. Define the membrane state of stress in shells. Derive equations of equilibrium, using membrane theory for cylindrical Shell and obtain  $M_x$ ,  $M_\theta$  &  $M_{x\theta}$  ? 12
7. State the assumptions in schorer's theory of cylindrical shells and derive the schorer's differential equation? 12
8. What are the differences in analysis and design of elliptic paraboloid and conoidal shells of double curvature by membrane theory? 12

**AR13**

**SET 1**

**Code No: 13MCS1004**

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

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

**SOFTWARE ENGINEERING  
(Computer Science and Engineering)**

**Time: 3 hours**

**Max. Marks: 60**

**Answer any FIVE questions  
All questions carry equal marks**

1. Explain in detail about evolutionary process models. [12M]
2. Explain in detail about requirements engineering tasks. [12M]
3. Explain in detail about software architecture styles [12M]
4. What are factors that will influence on user interface design ?explain clearly about user interface analysis and design [12M]
5. Explain in detail about testing strategies for conventional software [12M]
6. Explain briefly functional and non-functional requirements [12M]
7. Explain control specification and process specification for the system [12M]
8. a) Explain risk identification, risk projection, risk refinement [6M]  
b) Define use case? Draw use case diagram for safe home security? [6M]

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