

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

1. a) Describe the property lines in psychrometric chart with neat sketch. 4 M
b) In an air-conditioning unit, $3.5 \text{ m}^3/\text{s}$ of air at 27°C dry-bulb temperature, 50 percent relative humidity, and standard atmospheric pressure enters the unit. The leaving condition of the air is 13°C dry-bulb temperature and 90% relative humidity. Using properties from the psychrometric chart (a) calculate the refrigerating capacity in kilowatts and (b) determine the rate of water removal from the air. 8 M
2. a) One kg of air at 40°C dry bulb temperature and 50% relative humidity is mixed with 2 kg of air at 20°C dry bulb temperature and 20°C dew point temperature. Calculate temperature and specific humidity of the mixture. 4 M
b) 300 m^3 of air is supplied per minute from outdoor conditions of 40°C dry bulb temperature and 26°C wet bulb temperature to an air-conditioned room. The air is dehumidified first by a cooling coil having by-pass factor 0.32 and dew point temperature 15°C and then by a chemical dehumidifier. Air leaves the chemical at 30°C dry bulb temperature. Air is then passed over a cooling coil whose surface temperature is 15°C and by-pass factor 0.26. Calculate the capacities of the two cooling coils and dehumidifier. 8 M
3. a) Explain in brief as to how the human body reacts to changes in temperature of environment. Also explain the effect of activities on the heat load calculation for comfort application. 4 M
b) The exterior wall of a single-story office building is 3 m high and 15 m long. The wall consists of 100-mm face brick, 40-mm polystyrene insulating board, 150-mm lightweight concrete block, and an interior 16-mm gypsum board. The wall contains three single-glass windows 1.5 m high by 2 m long. Calculate the heat loss through the wall at design conditions if the inside temperature is 20°C . 8 M
4. a) Describe briefly on the equipment used for odor suppression and air sterilization. 6 M
b) A sudden enlargement in a circular duct measures 0.2 m diameter upstream and 0.4 m diameter downstream. The upstream pressure is 150 Pa and downstream is 200 Pa. What is the flow rate of 20°C air through the fitting? 6 M
5. a) Explain the working principle of sealed bellows-type thermostat with a neat sketch. 6 M
b) Describe different types of humidity and pressure control systems briefly with neat sketches. 6 M

6. a) A heat pump is used for a residence to supply 64,000 kJ of heat per hour. The pump has a coefficient of performance of 3 when outdoor temperature is 10°C and room temperature is maintained at 20°C . Under these conditions, the condenser and evaporator coil temperatures are maintained at 28°C and 5°C . Compute (a) The power required in kW when the combined motor-compressor efficiency is 0.8 and (b) EPR of the heat pump. 6 M
- b) Explain the air to water heat pump circuit in detail with the help of a neat sketch. 6 M
7. a) i) Define the “human comfort” and explain the factors which affect human comfort. 6 M
 ii) Define “thermal shock” used to air-conditioning systems. Describe the methods of reducing thermal shock.
- b) i) Explain the difference between comfort air-conditioning and industrial air-conditioning. 6 M
 ii) Explain how does the body attempts to compensate for a warm environment approaching body temperature.
 iii) Explain how does the body attempts to compensate for a cool which tends to lower the internal temperature.
8. a) i) What do you understand by the term ‘psychrometry’? 6 M
 ii) What is the difference between ‘wet bulb temperature’ and ‘thermodynamic wet bulb temperature’?
 iii) Write a short note on by-pass factor for cooling coils.
 iv) When is dehumidification of air necessary and how is it achieved.
- b) Describe the ‘spray type air-washer humidifier’ with the help of a neat sketch. 6 M

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)****I M.Tech. I Semester Regular Examinations, Jan/February, 2020****MICROCONTROLLERS AND APPLICATIONS****(Power Electronics and Drives)****Time: 3 Hours****Max Marks:60**

Answer any FIVE questions
All questions carry EQUAL marks

1. a) Draw and explain architecture of 8051 Microcontroller. (8M)
b) Discuss in brief the various registers in 8051 microcontroller. (4M)
2. a) Explain the following instructions with respect to 8051 microcontroller with examples. (6M)
(i) MOVC
(ii) PUSH
b) Explain the arithmetic instructions with respect to 8051 microcontroller with examples. (6M)
3. a) Discuss TCON register in 8051 with examples. (6M)
b) Explain the following pins with respect to 8051 microprocessor. (6M)
(i) ALE
(ii) $\overline{\text{PSEN}}$
4. a) Design a 2 KHz square wave generator using 8051 timer. Sketch the necessary hardware and develop the relevant ALP. (6M)
b) Interface an DAC with 8051. Sketch the interfacing diagram and develop an ALP to generate saw-tooth waveform. (6M)
5. a) Discuss the program memory and data memory related to PIC Memory Organization with the help of neat schematic diagram. (8M)
b) Discuss the addressing modes of PIC with examples. (4M)
6. a) Explain the different bits of STATUS Register with the help of an example in PIC 16F8XX. (6M)
b) Describe the I/O port organization and their features in PIC 16F8XX. (6M)
7. a) Draw and explain the Power Control Register (PCON) of 16F8XX PIC flash micro controller. (6M)
b) Develop an interface circuit for ADC with 8051 microcontroller. (6M)
8. a) Explain the various interrupt sources in 8051 with examples. (6M)
b) Explain the different measurement applications of microcontrollers with examples. (6M)

Answer any FIVE questions
All questions carry EQUAL marks

1. Draw the Block Diagram for Dice Game and explain the rules of the game and plot the ASM Chart [12M]
2. a) Find a good state assignment for the following State Table using the three guidelines (do not reduce the table first.) Try to satisfy as many of the adjacency conditions as possible shown in Table-1 [8M]

Present State	Next State		Output	
	X=0	X=1	X=0	X=1
A	F	D	0	0
B	D	B	0	0
C	A	C	0	1
D	F	D	0	0
E	A	C	0	1
F	F	B	0	0

Table-1

- b) Draw the ASM Chart for D flip-flop [4M]
3. a) Implement a Shift Register using FPGA [6M]
- b) Implement a Mealy Machine using CPLD [6M]
4. a) Explain about Bridging fault, Transient Fault and Intermittent fault. [6M]
- b) Using Boolean difference method, find the test vectors for SA0 fault on input line 1 and SA-1 fault at 2 shown in figure -1. [6M]

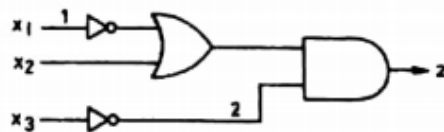


Figure-1

5. Using D Algorithm find the test vector at line 2 for SA0 fault for the following combinational circuit shown in figure 2. [12M]

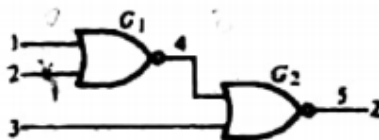


Figure -2

6. a) With an example explain about minimization and folding of a PLA. [6M]
b) Explain briefly about testable PLA design. [6M]
7. a) Explain about flow table with an example. [6M]
b) Explain about minimal closed cover with an example. [6M]
8. a) Find the test vectors of all SA0 and SA1 faults of the circuit function [7M]
 $F = x_1x_2 + x_1x_3'x_4' + x_2x_4$ using Kohavi algorithm
b) Explain about Stuck Open faults with an example. [5M]

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)****I M.Tech. I Semester Regular Examinations, January/February, 2020****CRYPTOGRAPHY AND NETWORK SECURITY****(Computer Science and Engineering)****Time: 3 Hours****Max Marks:60****Answer any FIVE questions
All questions carry EQUAL marks**

1. a) What is the difference between mono-alphabetic substitution ciphers and polyalphabetic substitution ciphers? 6
b) What are the two building blocks of all classical ciphers? 6
2. a) Explain the concepts of diffusion and confusion as used in DES with example? 6
b) How does the permutation/expansion step in DES enhance diffusion? This is the step in which we expand by permutation and repetition the 32-bit half-block into a 48-bit half-block 6
3. a) Describe the “mix columns” transformation that constitutes the third step in each round of AES? How do we now obtain the next four words w_4, w_5, w_6, w_7 from the first four words of the key schedule w_0, w_1, w_2, w_3 . 6
b) What are the steps that go into the construction of the 16×16 S-box lookup table in AES Cryptosystem? What is rationale for the bit scrambling step that is used for finding the replacement byte that goes into each cell of the S-box table of AES Algorithm? 6
4. a) Why Elliptic curve cryptography key size is comparatively lesser than other PKC ? What requirements must a public key cryptosystems fulfill to be a secure algorithm? 6
b) What is a common modulus attack in RSA ? Explain with example the use of Chinese Remainder Theorem CRT in anyone of the attack on RSA? 6
5. a) What problem was Kerberos designed to address? 6
b) List three approaches to secure user authentication in a distributed environment 6
6. a) What is meant by the strong collision resistance property of a hash function? How it is achieved in SHA-512 6
b) Write about applications of cryptographic hash functions. 6
7. a) How is IPSec grafted onto IPv4? The “Protocol” field of the IPv4header plays a critical role in this. How? Explain 6
b) Design and explain with neat sketch a modified and simple hand shaking protocol of SSL where the Server and Client are not maintaining the certificate but the keys and the algorithm for further message integrity and confidentiality is to be exchanged along with mutual authentication. 6
8. a) What are the weaknesses of a packet filtering firewall? What is the difference between a packet filtering firewall and a stateful inspection firewall? 6
b) Consider the following fragment: 6

```

legitimate code
    if data is Friday the 13th;
        crash_computer();
legitimate code

```

What type of malicious software is this?

ANALYTICAL AND NUMERICAL METHODS FOR STRUCTURAL ENGINEERING
(Structural Engineering)

Time: 3 Hours

Max Marks:60

Answer any FIVE questions
All questions carry EQUAL marks

1. a) Use Newton iterative method to find the root of equation $3x - \cos(x) + 1$, by taking initial guess 0.6. **7M**
b) Write a short note on Bisection method. **5M**

2. a) Design a computational algorithm to Implement Lagrange's interpolation formula and use it to compute the value of $F(5)$ from the following data for x and $F(x)$:
(2, 46), (7, 71), (10, 110). **6M**
b) Using Newton's forward formula, find value of $f(1.6)$, if **6M**

x	1	1.4	1.8	2.2
f(x)	3.49	4.82	5.96	6.5

3. Determine the values of h that will ensure an approximation error of less than 0.00002 when approximating $\int_0^{\pi} \sin x dx$ and employing : **12M**
a) Composite trapezoidal rule.
b) Composite Simpson's rule.

4. Use Runge-Kutta fourth order method to find the value of y when $x = 1$ given that $y = 1$ when $x = 0$ (taking $n = 2$) and $\frac{dy}{dx} = \frac{y-x}{y+x}$ **12M**

5. Apply Gauss-Seidal method to solve the equations **12M**
 $28x + 4y - z = 32$
 $x + 3y + 10z = 24$
 $2x + 17y + 4z = 35$

6. Solve the boundary value problem $\frac{d^2 y}{dx^2} - y = 0$ with $y(0) = 0$ and $y(2) = 3.62686$ **12M**

7. Find a real root, correct to three decimal places of the equation **12M**
 $2x - 3 = \cos x$ Lying in the interval $\left[\frac{3}{2}, \frac{\pi}{2}\right]$

8. Find the largest eigen value and the corresponding eigen vector of a matrix **12M**

$$\begin{bmatrix} 1 & 6 & 1 \\ 1 & 2 & 0 \\ 0 & 0 & 3 \end{bmatrix}$$

Code No: 16MVL1001

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

I M.Tech. I Semester Supplementary Examinations, Jan / February-2020

DIGITAL SYSTEM DESIGN & TESTING

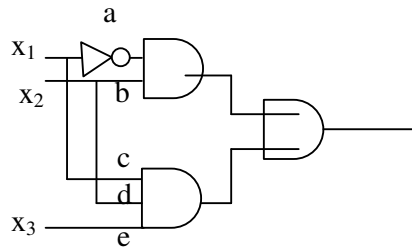
(VLSI System Design)

Time: 3 hours

Max. Marks: 60

Answer any Five questions
All questions carry equal marks

1. Explain the multiplication algorithm using ASM chart.
2. (a) What are limitations of FSMS?
(b) Explain k-Equivalence in the minimization of following state machine.
3. (a) Design and implement a 4 bit Gray to BCD code converter using ROM.
(b) Write short notes on Iterative circuits.
4. Find the minimum test set for all stuck-at faults by the Fault Table Method. Assume faults occur on lines only a, b, c, d & e.



5. (a) Derive the minimum test set using Kohavi algorithm for the following function.

$$F = 0201 + 1102 + 1211 + 0112$$

(b) A circuit realize as the function $z = x_1^1 x_4 + x_2^1 x_3 + x_1 x_4^1$. Using the Boolean Difference method, find the test vectors for SA0 & SA1 faults on all input lines of the circuit.
6. (a) What is a successor tree? When a homing tree becomes a successor tree.
(b) When a FSM is said to be definitely diagnosable?
7. (a) Implement the following Boolean expressions using PLA

$$f_1 = \sum (1, 3, 4, 5, 8-13)$$

$$f_2 = \sum (1, 3, 4, 5, 7, 9, 11, 13, 15)$$

$$f_3 = \sum (5, 7, 8, 10, 12, 13, 15)$$

(b) Explain possible faults in PLA.
8. (a) Explain the concept of race condition in asynchronous circuits? How these races can be eliminated.
(b) Write short notes on Hazards.
