(3 Hours) **[Total Marks:80]**

N.B. : (1) Question No 1 is Compulsory.
(2) Attempt any three questions out of the remaining five.
(3) All questions carry equal marks.
(4) Assume suitable data, if required and state it clearly.

1 Attempt any FOUR [20]
a Compare Amplitude modulation & Frequency modulation
b For AM receiver with Intermediate Frequency of 455 KHz, tuned at signal frequency of 1000 KHz, determine image frequency, and image-rejection ratio for Q=100.
c Explain Inter-symbol Interference (ISI).
d Write a note on different types of noise in communication.
e Draw & explain the transmitter block diagram of BFSK system.

2 a An AM modulator modulates modulating signal of 25kHz,10Vp with carrier signal of 800 kHz, 40Vp. Calculate:
(i) Upper & lower sideband frequencies
(ii) Modulation coefficient and percentage modulation
(iii) Draw output frequency spectrum
(iv) Draw the envelope & label it [10]
b Explain the phase shift method of SSB generation with block diagram. [10]

3 a Draw & explain the balanced modulator circuit for DSBSC wave generation. [10]
b A 100MHz carrier signal is frequency modulated by analog modulating signal. The maximum frequency deviation is 100KHz. Determine the approximate transmission bandwidth of FM signal using Carson's bandwidth rule if the frequency of modulating signal is (a) 1KHz (b) 500KHz [05]
c Write a note on Duo-Binary Encoding. [05]

4 a Explain the following terms w.r.t radio receivers.
(i) Sensitivity (ii) Selectivity
(iii) Image frequency rejection ratio (iv) Double spotting [10]
b Draw neat diagram & explain in detail
(i) PCM transmitter
(ii) Delta modulator [10]

5 a Draw & explain superheterodyne receiver with block diagram. Also draw the waveforms at output of each block. [10]
b What is Pre-Emphasis & De-emphasis? Explain. [05]
c Compare TDM & FDM. [05]

6 a Explain generation & detection of QPSK modulation technique with neat diagram and waveforms. Aso plot PSD of the modulated signal. [10]
b Draw & explain the 16-QAM receiver block diagram. [10]

(3 Hours) [Total Marks : 80

N. B. : (1) Question No. 1 is compulsory.
(2) Attempt any three out of remaining.
(3) Assume suitable data wherever required.

Q.1 Solve the following (**Any four**) [20]
A. What is randomization in system verilog. Explain it with proper example.
B. List various array datatype used in system verilog. Give one example of each.
C. Differentiate between deep and shallow copy related to object oriented programming.
D . Explain system on chip (SoC) and system in package (SiP).
E. List and brief the different types of Code coverage.

Q.2 A. Differentiate between ASIC, FPGA and CPLD based on their applications and cost. [10]
B. Write a System Verilog code for the following:
i. Declare dynamic array. Allocate 5 elements. Print out its size. [10]
ii. Declare a queue and initialize it with 5 string element. Insert new element @position 2.
iii. Is logic datatype in SV 2-state or 4- state? How it is different than wire.
iv. Create enumerated data type for all rainbow colours.
v. Declare 2D array. Display each and every element of it using foreach.

Q.3 A. What is thread? Explain various inter-process communications used by threads ? [10]
B. Draw the layered test bench diagram and explain each of blocks stating its functionality. [10]

Q.4 A. What is the significance of Interface and clocking block? Explain the modport with suitable example. [10]
B. Explain the concept of behavioral modelling. Write Verilog code for 4:1 mux using Behavioral modelling. [10]

Q.5 A). Write the System Verilog code for the following items: [10]
i. Create a class Ex1 containing two variables, 8-bit data and 4-bit address. Create a constraint block that keeps address to 3 or 4.
i. In an initial block, construct an Ex1 object and randomize it. Check the status from randomization.
ii. Create one more new class Ex2 so that:
a. data is always equal to 5
b. Probability of address = 4'd0 is 10%
c. Probability of address being between [1:14] is 80%
d. Probability of address = 4'd15 is 10%
Demonstrate its usage by generating 20 new data and address values and check for error.

B. Explain immediate and concurrent assertions in detail. [10]

Q.6 A. With suitable example explain how communication between threads is achieved with fork….join, fork…join_none and fork….join_any. [10]

B. What is coverage and cross coverage? Explain the Functional coverage? [10]

Time: 3 Hours **Marks: 80**

N.B.: (1) Question No. 1 is **Compulsory**.
(2) Attempt any **three** questions out of the remaining **five**.
(3) Each question carries 20 marks and sub-question carry equal marks.
(4) Assume suitable data if required.

1. Attempt any FOUR (20)

a) Define MIPS, CPI and MFLOPS.
b) Why does a superscalar processor use dynamic branch prediction? Justify.
c) Draw and explain a typical Instruction Cycle in a processor.
d) Compare CPU and GPU.
e) Why is there a need for communication between two processes? Also write techniques to implement IPC.

2. (a) Compare RISC and CISC architectures. (10)
(b) Explain Pre-emptive and Non-pre emptive scheduling. Give an example of each type. (10)

3. (a) Explain FIFO page replacement algorithm. Find out Miss ratio, Hit ratio for the following string using FIFO method. (10)
(Consider page frame size = 3)
4 , 7, 6, 1, 7, 6, 1, 2, 7, 2
(b) Explain various pipeline hazards. Explain the performance metrics for instruction pipelines. (10)

4. (a) Explain FCFS scheduling. For the given FCFS scheduling, calculate the average waiting time and average turnaround time. (10)

Process Id	Arrival Time	Burst Time
P1	0	2
P2	3	1
P3	5	6

(b) Consider a fully associative mapped cache of size 16 KB with block size 256 bytes. The size of main memory is 128 KB. Find the number of bits in tag. (10)

5 (a) Describe File organization and access. (10)
(b) Explain in detail Hardwired control unit. Discuss any one method to implement it. (10)

6. (a) List the difference between deadlock avoidance and prevention? Explain one deadlock prevention method. (10)
(b) Explain Multi-core processor architecture. (10)

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(3 Hours) **Marks: 80**

NB: (1) Question No.1 is **compulsory**.

(2) Attempt any **three** out of remaining **five** questions

(3) Assume suitable data, if necessary.

Q.1 Answer any **four** of the following: **20**

a) Explain the term Hamming Distance and define Hamming weight of a code word.

b) Write short notes on Lempel Ziv coding.

c) How to calculate channel capacity of Binary Symmetric Channel (BSC)

d) Define following terms:
i) Code rate ii) Code Vector iii) Hamming distance iv) Hamming weight v) Code efficiency

e) Explain various video compression techniques in brief.

Q.2 a) A (7,4) linear block code of which generator matrix is given as: **10**

$$G = \begin{vmatrix} 1 & 0 & 0 & 0 & 1 & 0 & 1 \\ 0 & 1 & 0 & 0 & 1 & 1 & 1 \\ 0 & 0 & 1 & 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 & 0 & 1 & 1 \end{vmatrix}$$

Find code vector for any six messages.
Write the parity check matrix of this code.

b) A 3 digit message is transmitted over a noisy channel having probability of error P(E)=2/5 per digit. Find the corresponding CDF. **10**

Q.3 a) A discrete memoryless source has an alphabet of seven symbols with probabilities for its output as described in table: **10**

Symbol	S0	S1	S2	S3	S4	S5	S6
Probabilities	0.25	0.25	0.125	0.125	0.125	0.0625	0.0625

Compute the Huffman Code and calculate efficiency.

b) Explain coder and decoder for cyclic codes. Also list the advantages and disadvantages of cyclic codes. **10**

Q.4 a) Explain Shannon's Theorem on channel capacity and calculate channel capacity of binary symmetric channel with error probability 0.2. **10**

b) Explain Viterbi algorithm in detail. **10**

Q.5 a) Determine the encoded message for the following 8 bits data coder using the following CRC generating polynomial. **10**

$P(x)= x^4+x^3+x^0$

11001100

01011111

b) Generator vectors for a rate 1/3 convolutional encoder are $g^{(1)}=101$, $g^{(2)}=110$, $g^{(3)}=111$. **10**

Draw block diagram of encoder and construct the state diagram.

Q.6 Write short note on any **four** of the following: **20**

a) Shannon Fano coding.

b) Channel Models.

c) Differentiate between CDF and PDF.

d) Code trellis and state diagram.

e) Explain MPEG audio coder.

(3 Hours) **[Total Marks: 80]**

N.B.: (1) Question No 1 is Compulsory.
(2) Attempt any three questions out of the remaining five.
(3) All questions carry equal marks.
(4) Assume suitable data, if required and state it clearly.

Q1. **Attempt any FOUR.** **[20]**

a Functional independence of a software design is assessed using which two criteria? highlight the differences between both. **[5]**

b Define Software Engineering. Describe in brief Umbrella activities of software development. **[5]**

c What are stubs and drivers? How are they different from each other? **[5]**

d Differentiate between white box and black box testing. **[5]**

e Explain size-oriented software engineering Metrics. **[5]**

Q2. a Explain any two requirement models using suitable example. **[10]**

b Explain COCOMO II cost estimation model in detail. **[10]**

Q3. a Discuss in detail about project Scheduling and Tracking. **[10]**

b A distance learning institute decides to use E-learning software. The tool will be used by students to register for various online courses, download study material, view lecture videos, upload assignments and appear for online exams. Faculty can take attendance, upload study material, conduct quizzes & exams online and teach one or more courses. Institute can see information about faculty and students, display results etc. Create an SRS document that includes **[10]**
a) product perspective
b) Scope and objective
c) Functional requirements
d) Nonfunctional requirements

Q4. a What is Agility in context of software engineering? Explain with suitable diagram Scrum framework. **[10]**

b Elaborate different types of software risks? Create Risk information sheet for a risk of high staff turnover. i.e., risk of many current employees working on the project leaving an organization. **[10]**

Q5. a Explain Software Design concepts in detail. **[10]**

b Discuss in detail about Spiral Model. In which kind of situation spiral model should be used? **[10]**

Q6. a Explain what is cyclomatic complexity? What are the different ways to calculate it? Perform basis path testing on a program which asks user to enter 3 sides of a triangle and checks whether Triangle is Isosceles, Equilateral or Scalene. **[10]**

b Explain McCall's quality factors. Explain SQA Activities. **[10]**

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(3 hrs.) Maximum Marks = 80

1. Question No. 1 is compulsory and solve any THREE questions from remaining questions
2. Assume suitable data if necessary
3. Draw clean and neat diagrams

			Marks
Q1.		Attempt any four	
	a.	Explain lifecycle of bugs with a neat diagram.	5
	b.	Explain the structure of the testing group.	5
	c.	Explain the method to perform loop testing in software.	5
	d.	Explain the need of test automation.	5
	e.	Discuss the challenges related to agile testing.	5
Q2.	a.	A Program accepts a, b, c as 3 sides of a triangle. The range of a, b, c is [1,100]. Program outputs type of triangle as one of scalene, isosceles, equilateral and not a triangle which is formed by a, b, c. Design test cases using Boundary Value Checking (BVC) and Robustness Testing Method.	10
	b.	Discuss regression testing.	10
Q3.	a.	Explain Software Testing Life Cycle in detail.	10
	b	What is a test plan document? Explain the components of test plan document.	10
Q4	a.	Consider a program to calculate the factorial of a number. It consists of main() program and the module fact(). Calculate the individual cyclomatic complexity of main() and fact() and then the cyclomatic complexity of whole program.	10

```
int fact(int);

main()
{
        int number;
1.      clrscr();
2.      printf("Enter the number whose factorial is to be found");
3.      scanf("%d",&number);
4.      if(number <0)
5.              printf("Factorial can't be defined for this numebr");
6.      else
7.              printf("Factorial is %d",fact(number));
8.}
int fact(int number)
{
        int index;
```

```
1.    int product=1;
2.    for(index=1; index<=number; index++)
3.          product=product*index;
4.    return(product);
5.}
```

b. Explain McCall's quality factors in detail. 10

Q5 a. Explain Object-oriented testing. 10

b. Explain acceptance testing in detail. 10

Q6 a. Explain ISO 9000:2000. 10

b. Explain goals of software testing. 10

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(3 hrs.) Maximum Marks = 80

NB:

1. Question No. 1 is compulsory and solve any THREE questions from remaining questions
2. Assume suitable data if necessary
3. Draw clean and neat diagrams

Q1. Attempt any four — Marks

a. Write HTML code to construct the following table — 5

My favorite textbooks

No.	Name	Author
1	Database Management Systems	Henry Korth
2	Automata Theory	jeffrey ullman
3	Data Mining	jiawei Han

b. Write HTML and CSS code to construct the following navigation menus — 5

Home About Us Products Services Portfolio Contact

c. Write the code using appropriate language to change the color of a button to yellow as soon as the mouse pointer is kept on the button. — 5

d. Discuss the features of Laravel framework. — 5

e. Write short notes on JQuery getters and setters. — 5

Q2. a. Write HTML code to build the following content. The user should be able to select only one car from the available cars such as: Audi, Nano, Alto, WagonR. If the user clicks on "Submit" button, it should re-direct it to "www.google.com" — 10

My favorite cars

Choose your favorite car:

Choose a car: Volvo Submit

b. Write HTML / CSS code to construct the following content with nav-bar. By default "Home" should be selected with black color. The color of other nav-bar menu should get changed automatically to "green", if you put the mouse cursor on that nav-bar menu. — 10

Home
News
Contact
About

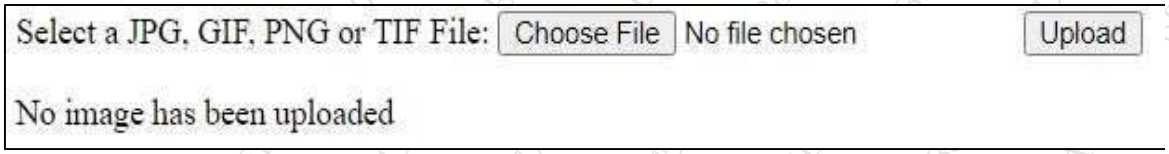
Hello World!

Some text..

Q3. a. Create a form using basic HTML to accept a number from the user with or without '+' or '-'sign. If the user has entered a pop-up box should appear with the message "you have entered a valid number". If the number entered by the user is not a valid number, then a message "you have entered an invalid number" should appear in the pop-up box 10

b Write short notes on bootstrap grid system. Write the code using bootstrap to divide a page into two parts vertically. In left hand side part, list your favorite cricketers (any 4). In right hand side part, list your favorite scientists (any 4). 10

Q4 a. Write the code in PHP to create a web page as shown below. When a file has been successfully uploaded the message "No image has been uploaded" should be changed to "image has been successfully uploaded". Note: only the mentioned file formats should be allowed for upload. 10



b Write short notes on MVC architecture 10

Q5 a. Write the code using PHP and JQuery, to create following web page. The "Hide/Unhide me" button should be used to hide and unhide the text displayed on the web page alternatively. 10

b Create four buttons with different colors using bootstrap. All four button should contain spinner (loading) symbol. Out of theses buttons, one button should be in permanently disabled state. 10

Q6 a. Write the code in PHP to connect to the database called as "mydb". The database username is "root" and the password for the user root is: "Test123". If the connection is successful, it should display the message "Connection established" on the screen. Otherwise it should print the message "Error in establishing connection". Now In this database create a table called "myguests" with the attributes "id", "first_name", "mobile_no" using PHP 10

b Write the code using HTML and JavaScript, which will display alert box with the message "Please enter a pass phrase". When clicked on "ok" button, the code should check whether the password entered by the user contains characters a-z and numbers 0-9. If so, it should print the message "password contains valid characters". If any special character is present in the password, it should print the message "invalid password" 10
