

Roll No...

No. of pages: 02

Date

SIXTH SEMESTER

B.E. (IT)

END SEMESTER EXAMINATION, May-2014

IT-311: MULTIMEDIA & APPLICATIONS

Time: 3:00 Hrs.

Max. Marks: 70

Note: Attempt ANY FIVE questions.

All questions carry equal marks.

Assume suitable missing data, if any

1. [a] Define multimedia. List various applications of multimedia. Explain in detail how multimedia can be incorporated in website designing.

[b] What is the advantage of the UNICODE standard over the ASCII standard? Also discuss about major text file formats.

2. [a] Distinguish between the Huffman coding and the LZW coding method of text compression with example.

[b] For the message "eaii!" encodes using arithmetic coding. Probabilities for the symbols are $a=0.2$, $e=0.3$, $i=0.1$, $o=0.2$, $u=0.1$, $!=0.1$. Also define the procedure of decoding.

3. [a] What is meant by a color model? Why do we require multiple color models? Explain with example.

[b] Compare lossless and lossy compression. Explain GIF compression.

4. [a] Discuss the fundamental characteristics of sound. Also explain the phenomena of masking using minimum threshold curve.
- [b] Explain in detail the elements of audio systems. List the various audio file formats.
5. [a] Explain the following video file formats MPEG, Real Video and H.261.
- [b] Differentiate between the three major TV broadcasting standards.
6. [a] Explain the principles of animation with example. Define keyframing and tweening.
- [b] How ordinary document is different from multimedia document? Explain the architecture of multimedia document.
7. **Write Short notes on any four:**
- [a] JPEG
 - [b] TCP/IP
 - [c] Network topology
 - [d] SGML
 - [e] Video on Demand
 - [f] MIDI

Roll No..

57/C

Date.....

B.E. (Information Technology-VIth Semester)
End Semester Examination – May 2014
IT-312 (Software Engineering)

Max. Marks-70

Time: 3:00 Hrs

Note: Attempt ANY FIVE questions. Q1 is compulsory.

All questions carry equal marks.

Assume suitable missing data, if any.

- Q1. [a] Explain the different types of classes proposed by UML?
[b] Explain the different modeling views proposed by UML? State the diagrams associated with each view?
[c] Differentiate between Baseline and Configuration Item?
[d] What are the different views of software quality?
[e] Explain the various levels of CMM and the KPA's at each level?
[f] Differentiate between Verification and Validation? List two techniques each of Validation and Verification
[g] Differentiate between Effective and Exhaustive Software Testing? (14)

- Q2. [a] Define Software Testing? Explain the goals of software testing in detail. (6)
[b] A program takes as input three angles and determines the type of triangle. If all the three angles are less than 90, it is an acute angled triangle. If one angle is greater than 90, it is an obtuse angled triangle. If one angle is equal to 90, it is a right angled triangle.
Design test cases for this program using equivalence class testing technique and also define the goals of equivalence class testing. (8)

- Q3. [a] What are the different stages of STLC? Explain in detail. (7)
[b] Explain the life cycle of a bug? How many states does a bug go through during its life cycle? (7)

- Q4. [a] Explain the different relationships in a Class Diagram? (4)
[b] For the requirements given below draw the Use Case Diagram. For any one Use Case write its narrative and draw its Activity Diagram (10)

A blood bank receives and stores blood donated by various people and also issues the blood to individuals or hospitals/nursing homes. The blood bank also has an in-house latest laboratory equipped with state of the art instruments to test samples of blood received from the donors. The blood bank has a panel of vendors which supply various non-consumable/consumable items as per requirements of blood. The blood bank also has a panel of doctors. Whenever a donor approaches the blood bank for blood donation his blood sample is taken and tested for various tests. If approved, few units of blood are taken and stored in the bank. The details of donor (name, address,

(b) blood group, telephone number) are stored in the blood bank database for future use. The donor is issued a card which is valid for a period of one year. The donor during this period by showing the card can get the free unit of blood in case of requirement. In case his blood sample is not approved, his application for blood donation is rejected. In case individuals or hospitals approach the blood bank for blood they are asked to replace the same number of units of blood.

Q5. [a] Explain in detail the various stages of the inspection process proposed by Fagan? How is it different from Gilb Inspection? (7)

[b] What is a State Chart Diagram? Explain with example (7)

Q6. [a] Explain the object oriented metrics proposed by Chidamber? Explain using a suitable example (7)
[b] Consider the program

```
#include <stdio.h>
main()
{
    int a,b,c,d;
    printf("enter a and b ");
    scanf("%d %d", &a, &b);
    printf("enter the option 1:addition, 2:subtraction, 3:multiply, 4:division");
    scanf("%d", &c);
    switch(c)
    {
        case 1: d = a+b;
        printf("sum=%d", d);
        break;
        case 2: d = a-b;
        printf("difference=%d", d);
        break;
        case 3: d=a*b;
        printf("product=%d", d);
        break;
        case 4: d=a/b;
        printf("quotient=%d", d);
        break;
    }
}
```

Draw the decision-to-decision graph for the program, calculate the cyclomatic complexity and list all the independent paths. (7)

Q7. Write short notes on ANY TWO of the following:-

[a] V&V Diagram

[b] Sequence Diagram

[c] Configuration Management

(14)

Note: Answer all questions,

Where (a) selecting any two parts from Q1, Q2, Q3 and Q4 and (b) selecting any four parts from Q5.

All question carry equal marks.

Assume suitable missing data, if any.

1.

- A. Jane's Furniture Store sells 2-, 3- and 4-seater sofas in two styles: classic and modern. At the end of May, Jane tallies the number of each type that has been sold in each style during May.

Style	Types (No. of seats)		
	2	3	4
Classic	8	24	4
Modern	8	8	12

Let X be the type of sofa (2-, 3-, or 4-seats) and Y be the style (classic or modern). Calculate the values of $H(X)$, $H(Y)$, $H(X; Y)$, $H(X/Y)$, $H(Y/X)$, and $I(X; Y)$.

- B. State and prove the noiseless coding theorem. What is an optimal code? Give an example of it.

C.

- i. Prove $I(X_i; Y_j) = I(Y_j; X_i)$
- ii. Define G and H matrix and show that $G \cdot H^T = 0$. [7X2]

2.

- A. The Z channel has binary input and output alphabets and transition probabilities $p(y/x)$ given by the matrix

$$Q = \begin{bmatrix} 1/3 & 2/3 \\ 1/2 & 1/2 \end{bmatrix} \quad x, y \in \{0, 1\} .$$

- i. Find the capacity of the channel and corresponding input probability distribution.
- ii. If n such channels are cascaded find the corresponding channel matrix.
- iii. Find the capacity of the cascaded channel system when n tends to infinity.

- B. What are linear block codes? Give its types? Define code rate. How does redundancy in code affect the efficiency and error?

- C. Consider a discrete memoryless source with alphabet $S = \{s_0, s_1, s_2\}$ whose output is modeled as a random variable S . The probability distribution on S is as follows: $P(S = s_0) = 0.7$, $P(S = s_1) = 0.15$ and $P(S = s_2) = 0.15$.

- i. Apply the Huffman algorithm to this source. Hence, show that the average code-word length of the Huffman code equals 1.3 bits/symbols.
- ii. Let the source be extended to order two. Apply the Huffman algorithm to the resulting extended source, and show that the average code-word length normalized to the number of encoded elementary symbols (i.e. two) of the new code equals 1.1975 bits/symbol.

- iii. Compare the average code-word length calculated in part (b) with the entropy of the original source. [7X2]

- A. A voice grade channel of telephone network has a bandwidth of 3.4KHz.
- Calculate the information capacity of the telephone channel for a signal to noise ratio of 30dB.
 - Calculate minimum signal-to-noise ratio required to support information transmission through the telephone channel at the rate of 9600b/sec.
 - Discuss bandwidth and S/N tradeoff.

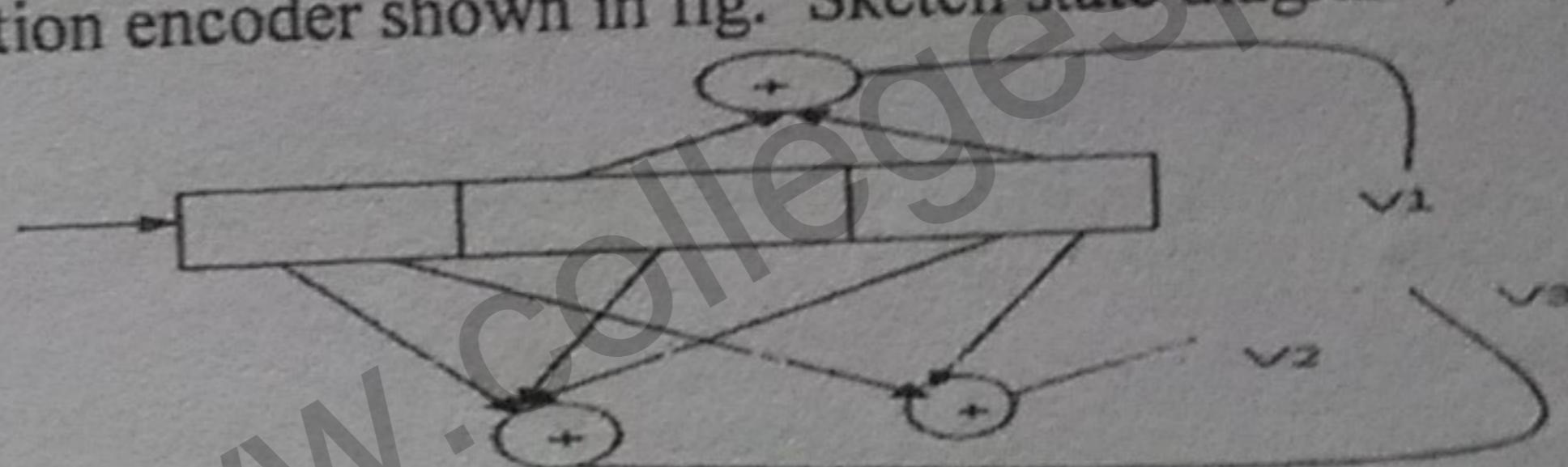
- B. i. A source has an alphabet of 4 letters. The probabilities of the letters and two possible sets of Binary codeword for the source are given below:

Letter	Prob.	Code I	Code II
a1	0.4	1	1
a2	0.3	01	10
a3	0.2	001	100
a4	0.1	000	1000

For each code, answer the following questions.

- Does the code satisfy the prefix condition?
- Is the code uniquely decodable?
- What is the mutual information provided about the event that the source letter is a1 by the event that the first letter of the codeword is 1?
- Consider the code {0,01} a) Is it instantaneous? b) Is it uniquely decodable? c) Is it nonsingular?
- Define differential entropy and explain it with an example.

- C. Consider convolution encoder shown in fig. Sketch state diagram, Tree diagram and trellis diagram.



[7X2]

4.

- A. For a (6,3) systematic linear block code, the three parity check bits c4,c5 and c6 are formed from following equations

$$C4 = d1 + d3$$

$$C5 = d1 + d2 + d3$$

$$C6 = d1 + d2$$

- i. Write generator matrix G.

- ii. Construct all possible code words.

- iii. Suppose that received word is 010111. Decode the received word by finding the location of the error and transmitted data bits.

- B. Consider the (7, 4) Hamming code defined by the generator polynomial $g(x) = 1+x+x^3$. The code word 1000101 is sent over a noisy channel, producing the received word 0000101 that has a single error. Determine the syndrome polynomial $s(x)$ for this received word. Find its corresponding message vector m and express m in polynomial $m(x)$.

- C. Explain the properties of entropy and obtain an expression for maximum and minimum entropy of a system. [7X2]

5. Write short notes on any four of the following:

- I. Adaptive Huffman Code II. Viterbi Algorithm III. Markov Process IV. BCH Code V. Golay Code

[3.5X4]

SIXTH SEMESTER**B.E. (IT)****END SEMESTER EXAMINATION, May-2014****IT-315: MICROWAVE AND SATELLITE
COMMUNICATION****Time: 3:00 Hrs.****Max. Marks: 70****Note: Attempt ANY FIVE questions.***All questions carry equal marks.**Assume suitable missing data, if any*

1. [a] Derive the expression for reflection and transmission coefficient for the case of oblique incidence when \mathbf{E} is perpendicular to the plane of incidence. [7]

[b] Write the physical significance of Maxwell's equations for time varying fields and show that if (\mathbf{E}, \mathbf{H}) are solution of source free Maxwell's equations in a simple medium characterized by the ϵ and μ , then solution also are $(\mathbf{E}', \mathbf{H}')$, where $\mathbf{E}' = \eta \mathbf{H}$ and

$H' = \frac{E}{\eta}$ where $\eta = \sqrt{\frac{\mu}{\epsilon}}$ is called the intrinsic impedance of the medium. [7]

2. [a] Derive the wave equation for electromagnetic signal and find out the γ , α and β parameters. [7]

[b] The magnetic field component of an EM wave propagating through a nonmagnetic medium ($\mu = \mu_0$) is

$$H = 25 \sin(2 \times 10^8 t + 6x) a_y \text{mA/m}$$

Determine:

- (i)- The direction of wave propagation.
- (ii)- The permittivity of the medium.
- (iii)- The electric field intensity.
- (iv)- Wave impedance

[7]

3. [a] Derive the general transmission line equations for two conductor transmission line. Henceforth find out the propagation constant and characteristic impedance of that line. [7]

[b] A lossless 75Ω transmission line is terminated by an impedance of $150 + j150 \Omega$. Using the Smith chart, find
 (i)- Γ_L
 (ii)- VSWR
 (iii)- Z_{in} at a distance of 0.375λ from the load,
 (iv)- The shortest length of the line for which impedance is purely resistive, and the value of this resistance. [7]

4. [a] Derive the **E** and **H** field for TM Mode in rectangular waveguide. [7]

[b] In a rectangular waveguide for which $a = 1.5$ cm, $b = 0.8$ cm, and $\epsilon = 4\epsilon_0$,

$$H_x = 2 \sin\left(\frac{\pi x}{a}\right) \cos\left(\frac{3\pi y}{b}\right) \sin(\pi \times 10^{11} t - \beta z) A/m$$

Determine

- (i)- The mode of operation
- (ii)- The cutoff frequency
- (iii)- The phase constant β
- (iv)- The propagation constant γ
- (v)- The intrinsic wave impedance η .

[7] [9]

5. [a] Find out the **E** and **H** field in the far field region for Hertzian dipole antenna, also Prove that the radiation resistance of Hertzian Dipole antenna is given by the relation

$$R_{rad} = 80\pi^2 \left(\frac{dl}{\lambda}\right)^2$$

[b] Define the following antenna parameter
 (i)- HPBW
 (ii)- Radiation intensity
 (iii)- Directivity

[5]

6. [a] What are the Kepler's laws of planetary motion. Define the orbital parameters and orbital element with suitable diagram. [8]

[b] A satellite in geo-synchronous orbit operating at 12GHz is at a distance of 35,900Km from earth station. The transmitted power is 10 watts, and both transmitting and receiving parabolic antennas are having diameter and efficiency of 3m and 55% respectively. Determine the power flux density and received power for the link-budget analysis. [6]

7. Write short note on
 (i)-Skin depth
 (ii)-Polarization
 (iii)-Retarded potential
 (iv)-Transponder
 (v)-Degenerative and dominant mode
 (vi)-VSWR
 (vii)-Antenna Array

[2x7=14]

Physical Constants and useful values

Speed of Light (c) = 3×10^8 m/s.

Permitivity of free space (ϵ_0) = $8.854187817 \times 10^{-12} C^2/N \cdot m^2$

Permeability of free space (μ_0) = $4\pi \times 10^{-7} N/A^2$

Intrinsic impedance of free space (η_0) = $120\pi \Omega$
