

Con. 3662-10.

S.E. I  
Software Engineering  
(3 Hours)

AN-2782

[Total Marks : 100]

- N.B. :** (1) Question No. 1 is **compulsory**.  
 (2) Answer any **four** out of remaining **six** questions.  
 (3) Make Assumptions if **required**.

1. (a) What do you mean by backtracking in process modeling? Mention the name of the model in which back tracking is not possible. [10]  
 (b) What is SRS document? Prepare SRS Document for Personal Investment Management System (PIMS) is intended to help the user keep account of his/her money invested in institutions such as Banks and Share Market ? [10]
2. (a) What is overall strategy for software testing? What are the guidelines which lead to successful testing strategies? [10]  
 (b) Explain different System Testing Approaches. [10]
3. (a) What do you understand by Process Maturity? Discuss CMM Level in details. [10]  
 (b) "Good software design reduces maintenance cost", justify it with example. [10]
4. (a) What are the advantages and disadvantages of FP over LOC based Software Estimation Techniques ? [ 10 ]  
 (b) What is version control ? The Software has version 1, version 1.1 and version 1.2. The version 2 is evolved from version 1.1. How do you assemble modules and retrieve version 2 from project database? [ 10 ]
5. (a) What is the significance of Software maintenance phase in SDLC? What would you do when system maintenance become an issue? [10]  
 (b) What is Project Scheduling and Tracking? Explain Error Tracking with suitable example. [10]
6. (a) What do you mean by Software Quality Assurance? Describe SQA Activities in detail. [10]  
 (b) How would you define Software Quality? What are the components of software quality cost? [10]
7. Write short notes on any four: - [20]
  - a. Software Metrics
  - b. W<sup>5</sup>HH Principle
  - c. Evolutionary Software Model
  - d. Risk Strategies and RMMM Plan
  - e. Formal Technical Review.

- N.B.** (1) Question No. 1 is **compulsory**.  
 (2) Attempt any **four** out of remaining **six** questions.  
 (3) Assume **suitable** data wherever **necessary**, justify the same.

1. (a) A system has unit sample response  $h(n)$  given by — 5

$$h(n) = -\frac{1}{4} \delta(n+1) + \frac{1}{2} \delta(n) - \frac{1}{4} \delta(n-1).$$

Is the system BIBO stable? Is the filter causal? Justify your answer.

- (b) Find the inverse of the z-transform — 5

$$x(z) = 4 + 3(z^2 + z^{-2}), \quad 0 < |z| < \infty.$$

- (c) If  $x_1(n)$  is even and  $x_2(n)$  is odd. What is  $y(n) = x_1(n) \cdot x_2(n)$ ? 5

- (d) Determine whether or not each of the following signal is periodic. If a signal is periodic, specify its fundamental period — 5

(i)  $x(n) = \cos\left(\frac{n\pi}{8}\right) \cos\left(\frac{2n\pi}{15}\right) + \sin\left(\frac{n\pi}{3}\right) \sin\left(\frac{n\pi}{4}\right)$

(ii)  $x(n) = e^{j\frac{3}{5}\left(n+\frac{1}{2}\right)}$

2. (a) Determine and sketch the magnitude and phase response of  $y(n) = \frac{1}{2} [x(n) + x(n-2)]$ . 10

- (b) Find the z-transform of the following sequences and specify the ROC:— 10

(i)  $x(n) = \left(\frac{1}{3}\right)^{n-1} u(n-1)$

(ii)  $x(n) = n a^n u(n)$

3. (a) Find the cross correlation of two finite length sequences  $x(n) = \{1, 2, 1, 1\}$  and  $y(n) = \{1, 1, 2, 1\}$ . 10

- (b) Find the DFT of a sequence  $x(n) = \{1, 2, 3, 4, 4, 3, 2, 1\}$  using DITFFT algorithm. 10

4. (a) For the the analog transfer function  $H(s) = \frac{2}{(s+1)(s+2)}$  determine  $H(z)$  using impulse 10

invariance method. Assume  $T = 1$  sec.

- (b) Find the circular convolution of the two finite duration sequences:— 10

$$x_1(n) = \{1, -1, -2, 3, -1\}$$

$$x_2(n) = \{1, 2, 3\}$$

5. (a) Design a digital Butterworth filter satisfying the constraints —

10

$$0.707 \leq |H(e^{j\omega})| \leq 1, \quad \text{for } 0 \leq \omega \leq \frac{\pi}{2}$$

$$|H(e^{j\omega})| \leq 0.2, \quad \text{for } \frac{3\pi}{4} \leq \omega \leq \pi$$

with  $T = 1$  sec. using Bilinear Transformation and realize the filter in direct form II.

- (b) Find the output  $y(n)$  of a filter whose impulse response is  $h(n) = \{ 1, 1 \}$  and input signal  $x(n) = \{ 3, -1, 0, 1, 3, 2, 0, 1, 2, 1 \}$  using overlap-add method.

10

6. (a) A causal LTI system is described by the difference equation —

10

$$y(n] = y(n - 1) + y(n - 2) + x(n - 1).$$

Find :

(i) The system function for the system. Plot the poles and zeros and indicate the ROC.

(ii) Find the unit sample response of the system.

(iii) Is the system stable or not ?

- (b) Determine the direct form II realization for the following system :—

10

$$y(n] = -0.1 y(n - 1) + 0.72 y(n - 2) + 0.7 x(n) - 0.252 x(n - 2)$$

7. Explain the following (any **three**) :—

20

- Decimation in frequency FFT
- DSP processors
- Windowing Technique of FIR filter design
- Finite word length effect
- Hilbert Transform.

Intelligent Systems

N.B. : (1) Question No. 1 is compulsory.  
(2) Attempt any four questions out of remaining six questions.

1. (a) What is knowledge ? Explain the characteristics of knowledge. Show the knowledge and artificial intelligence in the knowledge pyramid. 10  
(b) Differentiate between depth first search and breadth first search. 5  
(c) What is resolution ? Explain with example. 5
2. (a) Prove that A\* search algorithm is complete and optimal among all search algorithms. 10  
(b) Explain various methods of knowledge representation with examples. 10
3. (a) What is Agent ? Give in detail the different types of agents. 10  
(b) Explain Alpha-Beta pruning in Min-Max search. 10
4. (a) Describe Hill climbing algorithm. Suggest the method for problems associated in hill climbing algorithm. 10  
(b) What do you mean by Intelligent Agent ? Explain various types of intelligent agents with suitable example. 10
5. (a) How representation of knowledge is carried out in uncertain domain, explain with example. 10  
(b) Explain Genetic algorithm and Evolutionary programming. 10
6. (a) What is neural network ? Explain types of neural networks with example. How they are associated with intelligent system ? 10  
(b) Give the general structure of expert system and explain any expert system in relation with your general structure representation. 10
7. Write short notes on any two of the following :- 20
  - (a) Natural Language Processing
  - (b) Reinforcement Learning
  - (c) PEAS in Intelligent Systems
  - (d) Baye's Belief Networks.

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(Library)

Sem - VII | Rev | Comp.

15/6/2010

Con. 3264-10.

A.C.N.

AN-2797

(3 Hours)

[Total Marks : 100]

**Advanced Computer Networks**

- N.B. :** (1) Q. 1 is compulsory.  
(2) Attempt any **four** questions out of remaining **six** questions.  
(3) Assume **suitable** data wherever **required**.

1. (a) Explain the frame structure format used by LAPB protocol. Draw neat labeled diagram. (10)  
(b) Explain the three types of HDLC frames with neat labeled diagram. (10)
2. (a) Explain the following protocols used in networking: (10)  
UDP, ARP, IGMP, RARP, ICMP  
(b) Explain different issues in Access Network design and Backbone Network design. (10)
3. (a) Compare and contrast different WAN protocol. (10)  
(b) Compare and Contrast IPV4 and IPV6 protocol. (10)
4. (a) Explain ATM cell format with neat labeled diagram: (10)  
(b) Explain how ATM networks provide Qos guarantee. (10)
5. (a) Draw and Explain SONET architecture. Explain different SONET application. (10)  
(b) Explain different socket primitives for connection oriented transport layer service. (10)
6. (a) Compare Distance Vector with link state routing algorithms. (10)  
(b) What is network management? Explain tools and protocols used for it. (10)
7. Write a short note on any four of the following :- (20)
  - (a) X.25.
  - (b) FDDI.
  - (c) Role of Graphs and probability in networking.
  - (d) 3G Wireless Systems.
  - (e) Network Design Steps.

Con. 3126-10.

AN-2785

(3 Hours)

[ Total Marks : 100

N.B. (1) Question No. 1 is **compulsory**.(2) Attempt any **four** questions out of remaining **six** questions.

1. (a) Draw block schematic of pentium processor and explain its operation in brief. 10  
(b) Compare DEC Alpha AXP and Sun SPARC system architecture w.r.t. size of processor, no. of instructions, register model, Byte ordering and Data type. 10
2. (a) Draw the mode transition diagram of X86 processor and explain real and protected mode w.r.t. segment size, number of segments, paging size, virtual memory support, addressing mechanism and interrupt processing. 10  
(b) State the features of PCI bus. Draw a work station based on PCI bus and explain. 10
3. (a) Draw and explain DEC Alpha Processor Architecture—21064. 10  
(b) Explain Eflag register of X86 processors. 10
4. (a) Differentiate between GDT and LDT and state role of GDTR, IDTR, LDTR with suitable diagrams. 10  
(b) State the features of SCSI interface. Compare single ended and differential SCSI. Explain in detail SCSI bus phases. 10
5. (a) Explain following instructions of pentium : CPUID, RDTSC, SYSEXIT, INIT, WRMSR 10  
(b) Draw the architecture of super SPARC and explain. 10
6. (a) Explain various instructions formats of SPARC processor. 10  
(b) Explain Branch Prediction Logic. 10
7. Write short notes on any **three** of the following :— 20
  - (a) CALL gate mechanism
  - (b) Comport vs. USB
  - (c) EISA
  - (d) Internal data cache of pentium processor.

(Library)

Sem - VII Rev/Comp.

15/6/2010

47 : 1st half-10-DD (G)

I. P.

Con. 4009-10.

Image Processing  
(3 Hours)

AN-2794

[ Total Marks : 100

- N.B.** (1) Question No. 1 is **compulsory**.  
(2) Attempt any **four** questions out of remaining **six** questions.  
(3) Assume **suitable** data wherever **necessary** and state them **clearly**.

1. Justify / Contradict following statements :— 20
- (a) Image subtraction is used for scene matching and detection.
  - (b) Median filter is the best filter to remove salt and pepper noise in an image.
  - (c) Image resulting from poor illumination cannot be segmented easily.
  - (d) Image enhancement does not add any information.
  - (e) Lowpass filter is a smoothing filter.

2. (a) A  $64 \times 64$  image represented by 8 bits / pixel has following grey level distribution. 10

Grey level	0	1	2	3	4	5	6	7
No. of pixels	790	1023	850	656	329	245	122	81

Perform histogram Equalization and give new distribution of grey level. Show plots of original and equalized image.

- (b) Explain basic principles of detecting following in the image :— 10
- (i) Point
  - (ii) Lines
  - (iii) Edges
- Give  $3 \times 3$  mask for each of them and explain their operation.

3. (a) Explain following point processing operations :— 10
- (i) Digital negative
  - (ii) Contrast stretching
  - (iii) Thresholding
  - (iv) Grey level slicing
  - (v) Bit plane slicing.
- (b) Explain the properties of Discrete fourier transform. 10

4. (a) Explain the method of segmentation of images by Region splitting and Region Merging. 10
- (b) Differentiate between Lossy compression and lossless compression. 6
- (c) Classify with reasons the following data compression techniques into lossy and lossless :— 4
- (i) Huffman coding
  - (ii) Run length coding
  - (iii) DCT compression
  - (iv) Predictive coding.

5. (a) Explain the procedure of zooming an image using replication and interpolation. 10
- (b) What do you understand by image averaging and image subtraction ? 10

6. (a) What do you understand by Discrete Cosine Transform ? Explain it's application in image compression. 10
- (b) Explain the following morphological operation :— 10
- (i) HIT or MISS Transformation
  - (ii) Thining
  - (iii) Thickening
  - (iv) Skeletonization
  - (v) Purning.
7. Write short notes on any **four** of the following :— 20
- (a) Wavelet Transform
  - (b) Chain Codes
  - (c) K-L Transform
  - (d) Homomorphic Filtering
  - (e) Basic elements of an Image Processing System.