Roll No. ..... Total Pages : 3

BT-4/M-22 **44221**

MATHEMATICS FOR INTELLIGENT SYSTEMS

Course No. : PC-CS-CYS-202A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *five* questions in all by selecting at least *one* question from each unit. All questions carry equal marks.

UNIT–I

1. (a) Factor the matrix into A = LU, where

$$A = \begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}. \qquad 7\frac{1}{2}$$

(b) Find whether or not the set of vectors are linearly dependent or independent [1, 1, 1, 1], [0, 1, 1, 1], [0, 0, 1, 1], [0, 0, 0, 1]. 7½

2. Find the eigen values of A, B and A + B, where $A = \begin{bmatrix} 3 & 0 \\ 1 & 1 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 1 \\ 0 & 3 \end{bmatrix}$. Is the eigen values of A + B equal to or not equal to eigen values of A plus eigen values of B ? 15

UNIT–II

3. Let $x[n] = \delta[n] + 2\delta[n-1] - \delta[n-3]$ and $h[n] = 2\delta[n+1] + 2\delta[n-1]$. Compute and plot each of the following convolutions :

(i) $y[n] = x[n] * h[n]$.

(ii) $y[n] = x[n+2] * h[n]$. 15

4. Solve the equation $L\frac{di}{dt} + Ri = E_0 \sin \omega t$, where L, R and E_0 are constants and discuss the case when t increases indefinitely. 15

UNIT–III

5. A particle falls under gravity in a resisting medium whose resistance varies with velocity. Find the relation between distance and velocity if initially the particle starts from rest. 15

6. (a) A condenser of capacity C is discharged through the inductance L and a resistance R in series and the charge q at any time t satisfies the equation

$L\frac{d^2q}{dt^2} + R\frac{dq}{dt} + \frac{q}{c} = 0$. Given that L = 0.25 henry, R = 250 ohms, C = 2×10^{-6} farad and that when $t = 0$, the charge q is 0.002 coulombs and the current $\frac{dq}{dt} = 0$, obtain the value of q in terms of t. 7½

(b) Find the first six terms of the expansion of the function $f(x, y) = e^x \log (1 + y)$ in a Taylor's series in the neighbourhood of the point (0, 0). 7½

UNIT–IV

7. The odds that a book will be favourably reviewed by three independent critics are 5 to 2, 4 to 3 and 3 to 4, respectively. What is the probability that, of the three reviews, a majority will be favourable ? 15

8. (a) What is distribution ? Explain the types of distributions. 5

(b) If mean and variance of a binomial distribution are 4 and 2 respectively, find the probability of (i) exacty 2 success (ii) less than 2 success (iii) at least 2 success. 5

(c) Explain Monte Carlo simulations. 5

Roll No. ..... Total Pages : 3

BT-4/M-22 **44222**

OBJECT-ORIENTED PROGRAMMING SYSTEM

Paper–ES-CS-CYS-204A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *five* questions in all, selecting at least *one* question from each unit. All questions carry equal marks.

UNIT–I

1. (a) What is object and class? Explain with the help of a C++ program. 8

   (b) Identify the roles of accessifier. Explain with the help of a C++ program. 7

2. (a) Why is it necessary to use the header files while designing object-oriented programming system? Explain with the help of real time examples. 8

   (b) Explain the role of class scope and class member in C++. 7

UNIT–II

3. (a) What is role of 'This Pointer' in designing object-oriented programming system? Explain with the help of a C++ program. Also mention its limitations. 8

   (b) Identify the role of using inheritance. Design a class for multilevel inheritance using public, private and protected derivation. 7

4. (a) What are the roles of using constructors and deconstructors in object-oriented programming system? Explain copy constructor with the help of a C++ program. 8

(b) Explain friend class with the help of a C++ program. Also mention its limitations. 7

UNIT–III

5. (a) Identify the basic purpose of polymorphism. Explain virtual function and pure virtual function with the help of a C++ program. 8

(b) Give the general syntax of operator and functional overloading. List the operation which cannot be overloaded. 7

6. (a) Justify the concepts of prefix and postfix unary increment operators to be overloaded with the help of a C++ program. 8

(b) What is binding? Differentiate between static and dynamic binding. Write a program in C++ to illustrate these concepts. 7

UNIT–IV

7. (a) Why the text streams and binary streams are used in object-oriented programming system. Write a C++ program to illustrate the same. 8

(b) What are templates? How do templates work? With the help of C++ program, explain function template to implement bubble sort and class template to implement binary tree. 7

8. (a) Discuss the concept of stream manipulation with the help of a C++ program. 8

(b) What do you mean by exception? Discuss various exception handling mechanisms which are available in C++. Write a suitable C++ program to show exception handling. 7

Roll No. ..... Total Pages : 3

BT-4/M-22 **44219**

DATA BASE MANAGEMENT SYSTEMS

Paper – PC-CS-AIDS-210A/PC-CS-CYS-206A/
PC-CS-A/M/-206A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *five* questions in all, selecting at least *one* question from each unit. All questions carry equal marks.

UNIT–I

1. Describe the main characteristics of the database approach and discuss how it differs from traditional file systems. Also sketch the three-Schema architecture of the DBMS and explain.

2. Answer the following questions in brief :
   (a) What are the responsibilities of a DBA?
   (b) Explain the basic E-R model concepts of entities and their attributes with the help of an example.
   (c) What additional modelling concepts are included in the EER model apart from the ones that already exist in the ER model?

UNIT–II

3. (a) Define relation, tuples, attributes and domain in the context of Relational Data base management system.
   (b) Describe the PROJECT and JOIN operations of Relational Algebra with example.

4. Answer the following questions in brief :
   (a) Describe Referential Integrity constraints using an appropriate example.
   (b) Give an example of a query in SQL.
   (c) How is a view described in SQL?

UNIT–III

5. Discuss insertion, deletion and modification anomalies and describe the normalization process up to third normal form and also including Boyce-codd normal form. Highlight the concept of functional dependency and transitive dependency wherever applicable in the normalization process.

6. (a) What is multi-valued dependency and how is it related to fourth normal form (4NF)?
   (b) Define join dependencies and fifth normal form. Why is 5NF also called project-join normal form (PJNF)?

UNIT–IV

7. (a) Describe the properties of transactions that are used to maintain consistency in a database, before and after the transaction.

(b) Why and how is the concept of serializability of schedules used?

8. Answer any *two* of the following :

(a) Distinguish between binary locks and two phase locking.

(b) Discuss the time stamp ordering protocol for concurrency control.

(c) What is a deadlock? How can it be resolved?

Roll No. ..... Total Pages : 3

BT-4/M-22 **44218**

INTERNET & WEB TECHNOLOGY

Paper – PC-CS-AIDS-208A/ES-SC-SYS-208A/
PC-SC-A-ML-208-A

Time : Three Hours] [Maximum Marks : 75

Note : Students will be required to attempt *five* questions in all selecting at least *one* question from each Unit-I to Unit-IV. All questions carry equal marks.

UNIT–I

1. (a) Discuss the role of information architect in web engineering. Discuss organizational challenges for managing organizational information.

   (b) What are the different types of navigation systems and its integrated elements? How do you design an elegant navigation system? (8+7=15)

2. (a) Elaborate the steps for designing search interface for searching your web site. How do you search group content?

   (b) Draw a neat sketch and explore the components of high level architecture blueprint. (8+7=15)

UNIT–II

3. (a) How is XHTML better than HTML? Why would you want to use XHTML? How to create table and design forms?

   (b) What do you understand by HTML tags? How many tags are required to create a web page in HTML5? (8+7=15)

4. (a) What is Box model in Cascading Style Sheet (CSS)? Discuss the limitations and advantages of CSS. Explain different types of selectors in CSS.

   (b) Discuss CSS font properties, alignment of text and conflict resolution. (8+7=15)

UNIT–III

5. (a) Explain the difference between :

   (i) Undefined and not defined in JavaScript.

   (ii) The await keyword and the yield keyword.

   (b) What do you understand by host objects and native objects? How objects are created and modified? (8+7=15)

6. (a) What is regular expression in JavaScript and how it can be used for pattern? Explain with suitable example.

   (b) What is meant by control statements? Discuss different kind of loops with suitable illustration. (8+7=15)

UNIT–IV

7. (a) Why do we use slicing in strings? State any eight built in functions on Strings in Python.

   (b) Give a comparison between lists, tuples, dictionaries and sets. (8+7=15)

8. (a) Discuss int(), float(), str(), float() and complex() type conversion functions with examples.

   (b) What do you mean by an operand and an operator? Illustrate your answer with relevant example. (8+7=15)

Roll No. ..... Total Pages : 2

BT-4/M-22 **44226**

CRYPTOGRAPHIC FUNDAMENTALS

Paper–PC-CS-CYS-212A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *five* questions in all, selecting at least *one* question from each unit. Each question carry equal marks.

UNIT–I

1. Describe classical encryption techniques with suitable examples. (15)

2. (a) Explain Shannon's theory of confusion and diffusion. (8)

   (b) Write a short note on Data Encryption Standard. (7)

UNIT–II

3. (a) Explain the principles of public key crypto systems. (7)

   (b) Describe Diffie-Hellman key Exchange algorithm. (8)

4. (a) Explain MD5 message digest algorithm. (8)

   (b) Write a short note on Digital Signatures. (7)

UNIT–III

5. Describe Computer based Symmetric and Asymmetric Key Cryptographic Algorithms. (15)

6. Explain the following terms :
   (a) Information Management Technologies.
   (b) Multi-level relational data models. (15)

UNIT–IV

7. Define Intrusion detection. Explain security concepts of intrusion detection system. (15)

8. Explain the following terms in context to Intrusion Detection:
   (a) Vulnerability Analysis.
   (b) technical Issues. (15)
