CSE 3rd Sem.

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43138

BT-3/D-24

PRINCIPLES OF PROGRAMMING LANGUAGES

Paper : ES227/205-A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *five* questions in all selecting at least *one* question from each Unit.

UNIT–I

1. (a) How do readability, writability, and reliability contribute to the quality of a programming language? (5)

(b) How does a compiler convert high-level code to machine code? Explain. (5)

(c) How do different programming languages handle the declaration of constants? (5)

2. (a) What is an enumeration type, and how does it improve code readability and error prevention? (5)

(b) Explain the difference between implicit and explicit conversions. (5)

(c) Explain what an attribute grammar is and how it extends context-free grammars. (5)

UNIT–II

3. (a) Explain how custom types are defined in a programming language, and discuss their benefits. (5)

   (b) What are the differences between static and dynamic type checking for structured data types? (5)

   (c) How are strings represented in programming languages? Explain any two operations. (5)

4. (a) How do unions impact memory usage, and what are some potential pitfalls when using them? (5)

   (b) What is subprogram overloading, and how is it supported in programming languages? (5)

   (c) How do ADTs improve program design and maintainability? (5)

UNIT–III

5. (a) What are deadlocks, and how do they relate to sequence control in concurrent subprograms?

   (b) How do exceptions differ from regular control structures in terms of sequence control?

   (c) Explain the difference between static and dynamic scoping.

6. (a) How does the referencing environment affect variable binding and lookup? (5)

   (b) Explain how recursion is implemented and managed within the call stack. (5)

(c) How does sequence control differ between single statements, compound statements, and blocks? (5)

UNIT–IV

7. (a) What are the primary runtime elements that require storage allocation during program execution? (5)

   (b) How does garbage collection relate to system-controlled storage management? (5)

   (c) How does stack-based storage management work, and what is its role in function calls? (5)

8. (a) Explain the principles of structured programming and how it improves code readability. (5)

   (b) Compare memory management in C and C++. (5)

   (c) What is functional programming, and how does it differ from object-oriented programming? (5)

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43139

BT-3/D-24

DATA STRUCTURE AND ALGORITHMS

Paper : PC-CS-201A

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) Write a program to implement Binary Search on a one-dimensional array. 7

   (b) Explain the concept of data structures, differentiating between built-in and user-defined data structures. Discuss their applications in real-world scenarios. 8

2. Explain Bubble Sort algorithm and Quick sort algorithm in detail with suitable example also write their time complexities. 15

UNIT–II

3. Elaborate stack and different operations of stack. Write a program to evaluate a postfix expression using a stack. Explain with suitable example. 15

4. Explain queues and its types. Write algorithms for insertion and deletion in circular queue with suitable examples. 15

UNIT–III

5. (a) Differentiate static and dynamic implementations of data structures. 7

   (b) Explain the doubly linked list and its operations. 8

6. Discuss the implementation of stacks and queues using linked lists. Explain algorithms for insertion and deletion operations for both data structures. 15

UNIT–IV

7. (a) Elaborate the process of insertion and deletion in a BST with algorithms and time complexity analysis. 8

   (b) Explain AVL trees and its operations in detail with suitable example. 7

8. What is a minimum spanning tree? Explain Kruskal's or Prim's algorithm for finding the minimum spanning tree and write a program for its implementation. 15

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43140

BT-3/D-24

DIGITAL ELECTRONICS

Paper : ES-207A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt all questions.

1. (a) Perform following operations using 1's compliment method :

(i) 48–23.

(ii) 23–(.67). 5

(b) What are universal gates? Explain how these gates can be used as basic AND, OR and NOT gates? 5

(c) Simplify (A+B)(A' +C) to minimum number of literals. 5

2. (a) Explain the working of CMOS NAND gate. 7

(b) Minimize the expression using tabular method. $F = \Sigma m\ (1, 2, 4, 5, 6, 8, 9, 10, 13) + d\ (3, 7, 15)$. Also realize the obtained expression using AOI logic. 8

UNIT–II

3. (a) State and explain the working of BCD adder-subtractor with its logic diagram. 10

(b) Design an octal to binary encoder. 5

4. (a) Design a 4 bit even parity generator and checker. 5

(b) What do you mean by multiplexer? Explain the working of n : 1 mux. Design a multiplexer tree for 32 : 1 mux using 8 : 1 mux. 10

UNIT–III

5. (a) Explain the working of master slave flip flop. How it solves the problem of race around condition? 8

(b) Convert SR flip flop in JK flip flop. 7

6. (a) What is counter? Design an asynchronous mod-10 counter. 8

(b) Draw and explain the logic diagram of universal shift register. 7

UNIT–IV

7. (a) Mention the characteristics of Digital to Analog converter. 8

(b) Describe working of dual slope ADC. 7

8. (a) Draw the diagram of basic RAM cell. Explain SRAM and DRAM memories. Also describe how read and write operations occur in RAM. 8

(b) Write a note on PLA. Also explain implementation of PLA using ROM. 7

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43141

BT-3/D-24

OBJECT ORIENTED PROGRAMMING

Paper–PC-CS-203A

Time : Three Hours] [Maximum Marks : 75

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

UNIT–I

1. (a) Compare and contrast the structured programming and object oriented programming. Write about the libraries in C++ and how to add standard library in C++?

(b) Explain the structure of C++ Program with an example and define abstraction, encapsulation with syntax. (8+7=15)

2. (a) Discuss the use of public, private and protected access specifiers and their visibility in the class.

(b) How do you control access functions? Differentiate between Structures and class? Give an example.

(8+7=15)

UNIT–II

3. What is dynamic memory allocation and deallocation? Write a C++ program ensuring that your program contains special member functions like constructors, copy constructors and Destructors to create and destroy objects? (15)

4. (a) What is inheritance? How does it enable code reusability, explain with an example?

   (b) Discuss the effect of constructors and destructors of base class in deriving classes. (8+7=15)

UNIT–III

5. (a) Write a program to define virtual, non-virtual functions and determine size of the object.

   (b) Differentiate between static and dynamic binding. (8+7=15)

6. What is Operator overloading? Write a C++ program illustrating overloading NEW and DELETE operators? Give the operator in C++ which cannot be overloaded. Write any *four* rules for operator overloading. (15)

UNIT–IV

7. (a) Explain the role of seekg(), seekp(), tellg(), tellp(), function in the process of random access in a file.

(b) Write a C++ program involving input/output using overloaded operators << and >> and member functions of I/O stream classes. (8+7=15)

8. (a) Compare and contrast error and exception. Explain the following terms : Rethrowing Exception, Catching Exception, Exception Specification.

(b) What are non-type template arguments? Explain the Standard Template Library and discuss its working. (8+7=15)

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BT-3/D-24 **43142**

MATHEMATICS–III

Paper : BS-205A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt any *five* questions.

1. (a) Discuss the convergence of the series

$$\sum_{n=1}^{\infty} \left(\frac{n!}{(n^n)^2} \right).$$

(b) Discuss the convergence or divergence of the series

$$\frac{x}{1.2} + \frac{x^2}{2.3} + \frac{x^3}{3.4} + \ldots\ldots \quad x > 0.$$

2. (a) Obtain the Fourier series for $f(x) = e^{-x}$ in the interval $0 < x < 2\pi$.

(b) Obtain the Fourier expansion of $x \sin x$ as a cosine series in the interval $(0, \pi)$ and deduce that

$$\frac{1}{1.3} - \frac{1}{3.5} + \frac{1}{5.7} - - - = \frac{\pi - 2}{4}.$$

3. (a) Solve $\frac{dy}{dx} = \frac{x^3 + y^3}{xy^2}$ using exact differential equation.

(b) Solve the differential equation

$$\left(\frac{dy}{dx} \right)^2 - 5\frac{dy}{dx} + 6 = 0.$$

4. (a) Solve $\frac{d^3y}{dx^3} - 2\frac{d^2y}{dx^2} - 5\frac{dy}{dx} + 6y = e^{3x}$.

(b) Solve by the method of variation of parameters :

$$\frac{d^2y}{dx^2} + y = \text{cosec } x.$$

5. (a) Change the order of integration in the interval :

$$\int_0^1 \int_{x^2}^{2-x} xy \, dx \, dy.$$

(b) Show that area between the parabolas $y^2 = 4ax$ and $x^2 = 4ay$ is $\frac{16}{3}a^2$.

6. (a) Evaluate

$$\int_0^1 \int_0^{\sqrt{1-x^2}} \int_0^{\sqrt{1-x^2-y^2}} xyz \, dx \, dy \, dz.$$

(b) Calculate by double integration, the volume generated by the revolution of the cardioid $r = a(1 - \cos \theta)$.

7. (a) If $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$, show that grad $\frac{1}{r} = \frac{-\vec{r}}{r^3}$.

(b) Find the directional derivative of $\emptyset = x^2yz + 4xz^2$ at the point (1, –2, –1) in the direction of the vector $2\hat{i} - \hat{j} - 2\hat{k}$.

8. (a) Evaluate the line integral

$$\int_C (x^2 + xy)dx + (x^2 + y^2)dy,$$

where C is the square formed by the lines $x = \pm 1$, $y = \pm 1$.

(b) Using Green's Theorem, evaluate

$$\int_C (y - \sin x)dx + \cos x\, dy,$$

where C is the plane triangle enclosed by the lines

$$y = 0, x = \frac{\pi}{2} \text{ and } y = \frac{2}{\pi}x.$$

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43143

BT-3/D-24

BUSINESS INTELLIGENCE AND ENTREPRENEURSHIP

Paper–HM-902A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *five* questions in all out of eight questions, selecting *one* question from each unit. Each question carries 15 marks.

UNIT–I

1. Define Entrepreneur. Differentiate between Entrepreneur and Manager. Also, briefly explain the theories of Entrepreneurial motivation.

2. Answer the following questions in short :

(a) What are the various qualities of an effective entrepreneur.

(b) What are factors affecting entrepreneurship?

(c) What are the linkages between the Entrepreneurship development and Economic development?

(d) Explain how far entrepreneurial training is useful in affecting Entrepreneurship.

UNIT–II

3. What factors are involved in the process of sensing an entrepreneurial opportunity? What is required to convert an idea into opportunity? Also, examine the sources from where business ideas emerge.

4. Discuss the purpose of marketing, financial and technical feasibility studies. What are the issues evaluated in these studies?

UNIT–III

5. How do small scale industries contribute to the socio-economic development of India? Discuss the problems faced by small scale industries.

6. Explain the following :
   (a) Formalities for getting NOC from Pollution Board.
   (b) Any *two* state level institutions that provide assistance to SSI.
   (c) Selection of Machinery for a small industry and process of registration.
   (d) Methods and tools used in project planning, scheduling and appraisal.

UNIT–IV

7. Discuss the support provided by National Small Industries Corporation Ltd (NSIC) and Small Industries Development Organization (SIDO) to small scale industries in the country.

8. Describe briefly, the Finance Facilities Offered by SIDBI to small industries. Also, explain the role of SIDBI in promotion, marketing management and Export marketing of medium and small enterprises in India.

CSE5th/ Lab

Roll No. ..... Total Pages : 04

BT-5/D-24 45168

MICROPROCESSOR AND INTERFACING

ES-301A

Time : Three Hours] [Maximum Marks : 75

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

Section I

1. (a) Create a schematic representation of the 8086 microprocessor's functional components and elaborate on the concept of Pipelining. **10**

   (b) Explain the concept of Memory Segmentation in detail. **5**

2. (a) Illustrate the pin layout of the 8086 microprocessor and provide a detailed explanation of each pin's purpose. **10**

   (b) Describe the role of the 8284 chip in generating timing and reset signals for the 8086 microprocessor. **5**

Section II

3. (a) Provide and analyze the timing diagram for a memory read operation in the 8086 microprocessor's Minimum Mode. **10**

   (b) Classify semiconductor memories. Describe the procedure of interfacing static memories with a CPU. **5**

4. (a) Sketch and explain the interface of 8 K × 8 RAMs and 8 K × 8 E^2PROM using a decoder in minimum mode. **10**

   (b) Give the cell structures of PROM and E^2PROM memories. **5**

Section III

5. (a) Generate the HEX codes for the following instructions : **10**

   (i) Mov AX, [SP+DI][2000]

   (ii) Mov AX, BX

   (b) Explain the following instructions with an example for each : **5**

   (i) LDS

   (ii) XLAT

   (iii) AAA

   (iv) DAA

   (v) ROL.

6. (a) Define Addressing Modes and explain all the valid addressing modes for 8086 microprocessor. Explain the different assembler directives for 8086 microprocessor. **10**

(b) Write a 8086 ALP to convert a given hexadecimal number into its equivalent ASCII code. **5**

Section IV

7. (a) Interface 8-bit ADC with 8086 using 8255 ports. Configure port A of 8255 for transferring output of ADC to the CPU and port C for control signals. Assume that an analog input is present at I/P2 of the ADC and a clock input of suitable frequency is available for ADC. Draw the schematic and write the required assembly language program. **8**

(b) Draw and explain the pin configuration and the internal architecture of 8255. Write a BSR mode control word subroutine to set bits PC7 and PC3 and reset them after 10 milli seconds. The port address selected is 83h. **7**

8. (a) With the help of a block diagram, explain the functioning of Intel 8259 chip. 8

(b) Explain in detail the functioning of 8237 DMA controller. 7

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BT-5/D-24 45169

DATABASE MANAGEMENT SYSTEMS

PC-CS-301A

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. What do you mean by data abstraction ? Also explain physical data independence and logical data independence with the help of example and strcuture. 15

2. What do you mean by keys ? Explain Unique key, primary key, candidate key and foreign key. Also explain Mapping constraint in dbms. 15

Unit II

3. What is tuple relational calculus(TRC) and domain relational calculus(DRC) ? What are uses of TRC and DRC ? Explain the difference with the help of an example. 15

4. What do you mean by aggregate function ? Also explain DDL, DML and DCL with the help of an example. 15

Unit III

5. What do you mean by functional dependency and also explain 3rd Normal form and BCNF form with the help of example table data ? 15

6. What is Query optimization ? Explain join algorithem, statistics and cost based optimization with the help of an example. 15

Unit IV

7. What are different types of failure in detail ? Also explain timestamp concurrency control and validation in detail with the help of example. 15

8. What is dead lock and explain ACID property of Data-base management systems ? Explain commit and lock in distributed data-bases. 15

Roll No. ..... Total Pages : 03

BT-5/D-24 **45170**

FORMAL LANGUAGE AND AUTOMATA THEORY

PC-CS-303 A

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) Create a regular expression to identify valid variable names in a programming language. A variable name should : begin with a letter (a-z or A-Z) or an underscore (_) and be followed by letters, digits (0-9), or underscores.

(b) Prove that every ε-NFA can be converted to an equivalent NFA without ε-transitions. Describe the steps involved in this conversion.

2. (a) What are the fundamental differences between a Deterministic Finite Automaton (DFA) and a Non-deterministic Finite Automaton (NFA) ? Prove that

every language that can be accepted by an NFA can also be accepted by a DFA.

(b) Define Finite State Automata. Construct a DFA for the regular expression $(0 \mid 1)^*00(0 \mid 1)^*$.

Unit II

3. (a) Use the Pumping Lemma to prove that the language $L = \{a^n b^n c^n \mid n \geq 1\}$ is not context-free.

(b) Why is every Type 2 language also a Type 1 language, but the reverse is not true ? Provide an example to illustrate this point.

4. (a) Define the concept of ambiguity in context-free languages. Can every ambiguous context-free language be converted into an unambiguous grammar ? Discuss.

(b) Construct a context-free grammar for the language $L = \{a^n b^m \mid n,\ m \geq 1 \text{ and } n \leq m\}$. Show that this language is context-free.

Unit III

5. (a) What is a Moore machine ? Construct a Moore machine that outputs 1 whenever it encounters three consecutive 1s in the input sequence and outputs 0 otherwise.

(b) Define a Push-down Automaton (PDA). What are the components of a PDA ? Provide the formal definition of a PDA using the tuple notation.

6. (a) What is Mealy machines ? Explain why Mealy machines tend to have fewer states than Moore machines for the same problem.

(b) What is the relationship between Context-Free Grammars (CFGs) and PDAs ? How can a CFG be converted to an equivalent PDA ?

Unit IV

7. (a) Define Post's Correspondence Problem (PCP). Prove that the Post's Correspondence Problem is undecidable.

(b) Describe the relationship between the classes P and NP. Is P a subset of NP ? Explain.

8. (a) State Rice's Theorem. Explain why the property "the language recognized by a Turing machine is finite" is undecidable according to Rice's Theorem.

(b) What is the Travelling Salesman Problem (TSP) ? Is it NP-complete ? Justify your answer.

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BT-5/D-24 45171

ESSENTIAL OF INFORMATION TECHNOLOGY
PC-SS-305A

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) Explain different types of Operators along with their Associativity and Precedence in JAVA. 8

   (b) What is a Constructor ? What are the various methods for Constructor Overloading ? Write a program in Java to perform Constructor Overloading. 7

2. (a) What is JVM (Java Virtual Machine) ? Explain its working. 5

   (b) Differentiate between Package and Interface by giving example. 5

(c) How Exceptions are handled in Java ? 5

Unit II

3. (a) What are Applets ? Explain the life Cycle of an Applet. 7

(b) What are Event classes in JAVA ? How they are handled ? 8

4. (a) What are Container Classes ? Explain different types of it. 7

(b) Write a program to create a Frame in AWT by extending Frame Class. 8

Unit III

5. (a) Write the difference between GET and POST methods of Servlets, why they are used ? 7

(b) How parameters are passed to Servlets in a program ? 8

6. Write notes on the following : 15

(i) Session Tracking

(ii) Cookies.

Unit IV

7. Explain the various steps to connect database in JAVA. 15

8. (a) What are the differences between execute, executeQuery and executeUpdate ? 7

   (b) What are different JDBC API components ? 8

Roll No. ..... Total Pages : 03

BT-5/D-24 **45172**

COMPUTER ORGANIZATION AND ARCHITECTURE

PC-CS-307A

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) Describe the evolution of computer generations. Mention the key features of each generation. 8

   (b) Explain the digital arithmetic algorithm for binary addition and subtraction. Illustrate with examples. 7

2. (a) What are the various types of memory that comprise hierarchy and how do they differ in terms of speed, capacity and cost ? 8

   (b) What is cache memory ? Explain its purpose and working mechanism. 7

Unit II

3. (a) Explain the common bus system in a computer. How does it help in connecting the computer's components ? 7

   (b) What is the role of timing and control in a computer system ? Discuss the stages of the instruction cycle. 8

4. (a) Compare hardwired control units and microprogrammed control units. Which is more efficient and why ? 8

   (b) Discuss the difference between horizontal and vertical microprogramming. Give examples of both types. 7

Unit III

5. (a) Describe the gen2eral register organization in CPU architecture. What are the advantages of using a general-purpose register set ? 8

   (b) Describe direct addressing mode. How does it differ from indirect addressing mode ? Provide examples for both. 7

6. Discuss Flynn's taxonomy of computer architecture. Explain the differences between SISD, SIMD, MISD, and MIMD. **15**

Unit IV

7. (a) Explain the process of CPU-IOP communication. How does this communication improve the efficiency of data transfer in a system ? **8**

   (b) Explain, how are priority interrupts handled in a computer system ? **7**

8. Discuss the different modes of data transfer: Programmed I/O, interrupt-driven I/O and Direct Memory Access (DMA). **15**

Roll No. ..... Total Pages : 02

BT-5/D-24 45176

ADVANCED ALGORITHMS(E_I)
PE-CS-T-307A

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. (i) Explain Master Theorem with suitable example. 7

   (ii) List various binary tree used for algorithms. Explain the working of any *one* with example. 8

2. (i) Find the time complexity (all case) of any *one* sorting technique. 8

   (ii) Discuss the role of Pseudo code convention in algorithms. 7

Unit II

3. (i) Define Hiring Problem. Discuss its probabilistic analysis. 8

(ii) Explain matrix chain multiplication with example. 7

4. (i) Discuss Knapsack problem and its solution. 7

(ii) Write a short note on activity selection problem. 8

Unit III

5. (i) Write and discuss the significance of Dijkstra's algorithm. 7

(ii) Differentiate Kruskal and Prim algorithms with example. 8

6. (i) Write and explain All pair shortest path-Floyd Warshall Algorithm. 7

(ii) Differentiate DFS and BFS with suitable example. 8

Unit IV

7. Discuss the various steps in String matching with finite automata in detail. 15

8. (i) Discuss various steps involved in Naïve string matching algorithm. 7

(ii) Write and explain Knuth-Morris-Pratt Algorithm. 8

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

BT–7/D-24 **47244**

SOFTWARE VERIFICATION AND VALIDATION AND TESTING

Paper–PE–CS–D403A

Time Allowed : 3 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 a Test Oracle? Provide examples of different types of Test Oracles.

   (b) Define Software testing. Why is early testing considered beneficial in the Software development life-cycle?

2. (a) What is the key difference between Validation and Verification? Describe the role of user acceptance testing (UAT) in Validation.

   (b) Differentiate between Error, Fault and Failure. How can static code analysis tools be used to detect Logical and Data faults in source code?

UNIT–II

3. (a) Define Cyclomatic complexity? How would you use Cyclomatic complexity to decide the number of test cases in path testing? Explain using suitable examples.

   (b) Differentiate between Data flow based and Control flow based testing.

4. (a) What is Mutation testing? How does mutation testing help in evaluating the effectiveness of a test suite? Discuss.

   (b) What is Boundary value analysis? What types of faults are detected by it? Illustrate.

UNIT–III

5. (a) What is Regression testing? How do you prioritize test cases for Fegression testing in large projects? Discuss.

   (b) What is Slice based testing? Describe how backward Slicing and Forward slicing are used in slice-based testing ?

6. (a) What is Domain testing? What is the role of input partitioning in Domain testing? Discuss.

   (b) What is Integration Testing, and how does it differ from Unit Testing? Explain the difference between Big Bang Integration and Incremental Integration testing.

UNIT–IV

7. (a) What are the different dimensions of a Software as per McCall quality model? Explain.

   (b) What is Stress testing? How is it different from load testing? Explain.

8. (a) What is the Capability Maturity Model (CMM)? What are Key Process Areas (KPAs), and how do they vary across different CMM levels?

   (b) What is Extreme Programming (XP), and how does Extreme Testing fit into this methodology? Discuss.

Roll No. ..... Total Pages : 4

BT–7/D-24 **47246**

NEURAL NETWORKS AND DEEP LEARNING

Paper–PE–CS–D411A

Time Allowed : 3 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 are Biological Neurons ? How they help in creating artificial neuron model ? Compare and contrast Biological neurons with Artificial Neural Networks. 7

   (b) Describe the three main Learning methods used in neural networks supervised, unsupervised, and reinforcement learning. What are the key characteristics of each method, and in what scenarios might one be preferred over the others? 8

2. (a) Discuss the various types of Neural network architectures classified in the taxonomy of Neural networks. What are some key characteristics of popular architectures such as Feedforward, Convolutional and Recurrent neural networks? 7

(b) Explain the terms Weights, Bias, Threshold, and Learning rate in the context of Neural networks. How do these parameters influence the Training and performance of a Neural network model? 8

UNIT–II

3. (a) Explain the fundamental principles of Hebb network theory. How does it differ from other learning paradigms in Neural networks, particularly in terms of its approach to weight adjustment during training? 7

(b) Describe the Architecture of a Perceptron network and outline the Training algorithm used for a single-layer perceptron. What are the limitations of perceptron's in solving complex problems? 8

4. (a) What is the Architecture of a back propagation network? Describe the back propagation training algorithm and discuss how it enables the network to minimize error during the learning process ? 7

(b) Write short notes on the following : 4×2=8

(i) Hebb network Theory.

(ii) Counter Propagation Network Architecture.

(iii) Training Algorithms.

(iv) Unsupervised Neural Network.

UNIT–III

5. (a) Explain the architecture and training algorithm of Kohonen's self-organizing feature maps. How do these maps facilitate unsupervised learning, and what are some practical applications? 7

   (b) Describe the architecture of a learning vector quantization (LVQ) network. What is the training algorithm for LVQ, and how does it differ from traditional supervised learning methods? 8

6. (a) What is the architecture of a Boltzmann machine, and how does its training algorithm work? Discuss the concept of stochasticity in Boltzmann machines and its implications for learning complex distributions. 7

   (b) Write short notes on the following : 8

   (i) Electro-optical Multipliers.

   (ii) Holographic Correlators.

UNIT–IV

7. (a) Define overfitting and underfitting in the context of machine learning. What strategies can be employed to mitigate these issues when training models, particularly in linear regression? 7

(b) Explain the supervised learning approach of support vector machines (SVMs). How do SVMs find the optimal hyperplane for classification, and what role do kernels play in this process? 8

8. (a) Compare and contrast deep forward networks, convolutional networks, and deep recurrent networks. 7

(b) What are the fundamental concepts of machine learning? Discuss the differences between supervised, unsupervised, and reinforcement learning, providing examples of each. 8

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

BT–7/D-24 **47249**

CYBER LAW AND ETHICS

Paper–OE–CS–401A

Time Allowed : 3 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) How Internet can be used as a tool for Global access ? Explain. 10

   (b) Write short note on Hierarchy of Courts. 5

2. Explain the following terms : 15

   (a) Doctrinal Approach.

   (b) Consensual approach.

   (c) Real Approach.

UNIT–II

3. Explain the term Cryptographic Algorithm and what do you mean by Public and Private Cryptography ? 15

4. Explain IT Act 2000 in detail with its limitations. 15

UNIT–III

5. Illustrate the term Electronic Database and how the Database is protected by various methods explain ? 15

6. Explain the following terms : 15

   (a) Criminal Procedure Code.

   (b) Relevant sections of Indian Penal Code.

   (c) Relevant sections of Bankers book evidence Act.

UNIT–IV

7. Explain the term Artificial Intelligence with example and write some ethical issues related to Artificial Intelligence. 15

8. Explain the need and significance of Cyber law for Society. Also explain its importance. 15

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CLOUD COMPUTING

PE-CS-A402A

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) Interpret the basic role of using various computing paradigms and how these paradigms are evolved ? **8**

(b) Identify the basic usages of distributed computing and utility computing. Explain the real time situation where these can be used in the final deployment of cloud computing models. **7**

2. (a) With the help of suitable examples of various techniques used in cloud computing, identify the basic roles of cloud service provides and open standards. **8**

(b) Differentiate between cluster computing and grid computing by mentioning its *pros* and *cons*. 7

Unit II

3. (a) What are the various protocols which are used in the cloud computing ? Also examine the working model of SaaS and open source model of cloud computing, and explain the situations where these models can be deployed. 8

(b) Explain the working architecture of cloud computing with the help of its functional diagram. Also, highlights the basic of cloud computing stack. 7

4. (a) Recognize the basic role of using various wen services in cloud computing. Differentiate between XaaS and IaaS service models of cloud computing. 8

(b) Distinguish between hybrid cloud and community cloud models. Which network protocols are basically used in the cloud computing environment ? 7

Unit III

5. (a) Define scalability and accounting in cloud computing. Identify the various benefits of using these approaches in cloud computing. 8

(b) With the help of some real time practical example, explain the case study of Amazon EC2 for the efficient deployment of cloud service management. 7

6. (a) Define Service Level Agreements (SLAs) and economics of scaling in cloud computing. How the SLAs levels are efficiently used in the cloud computing ? 8

(b) With the help of some real time practical example, explain the case study of Eucalyptus for the efficient deployment of cloud service management. 7

Unit IV

7. (a) With the help of some real time practical example, how division and replication of data in cloud computing is done for optimal performance and security ? 8

(b) Differentiate between the following : 7

(i) Network level security and application level security

(ii) Infrastructure level security and host level security.

8. (a) What are the various jurisdictional issues which might be raised during data location and data identification in cloud computing ? **8**

(b) Identify and explain the various commercial and business considerations in the final deployment of cloud computing platforms. **7**

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CYBER SECURITY

OE-CS-402A

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 are the fundamentals of Cyber-Crimes ? Explain different types of Cyber-Crimes. **8**

(b) How crime against individual happens ? Discuss about cyber extortion and cyber terrorism. **7**

2. (a) Discuss about stream and block ciphers. Explore the principles of block cipher. Explain Fiestal structure. **8**

(b) What are the strength of Data Encryption Standards (DES) ? Explain differential and linear crypt analysis of DES. **7**

Unit II

3. (a) What is MD5 algorithm used for ? Write the steps followed by MD5 algorithm.

   (b) Discuss the Components and Process Flow of Secure Hash Algorithm (SHA_1).

   (c) Highlight the benefits and burdens of using Digital Signature Standards (DSS). **3×5=15**

4. (a) What is Kerberos used for ? Elaborate the main components of Kerberos. Explore the working of X.509 Authentication Service Certificate. **8**

   (b) Differentiate between PGP and S/MIME. Why e-Mail compatibility function in PGP is needed ? **7**

Unit III

5. (a) What are the causes of cybercrime ? Explain the measures to prevent it.

   (b) Explore the mechanism for hardware protection and archival storage.

   (c) Why data security is important ? What 3-2-1 rule of backup includes ? **3×5=15**

6. (a) Explain the relation between firewall and VPN. Which one to use and when ?

(b) How does CPU protection prevent a process from monopolizing the CPU ?

(c) What are trusted systems ? Discuss the following security threats : Worms, Bots Spyware. 3×5=15

Unit IV

7. (a) Explain the different phases of digital forensic life-cycle. Highlight about hardware and software required for digital forensic. 8

(b) What are the different types and branches of digital forensic ? Explain the challenges in digital forensic. 7

8. (a) Why do we need cyber laws ? Discuss cybercrimes and punishment as per Indian IT Act.

(b) Explain the provisions of digital signatures Indian IT Act against Cyber Crimes.

(c) Write the law perspective of cyber crimes and cyber security around the world. 3×5=15

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WEB AND INTERNET TECHNOLOGY

OE-CS-410

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. Explain the basic structure of the Internet. What are the key components ? Define and explain the significance of the following terms in the context of the Internet : IP address, domain name, DNS, HTTP and URL.

2. Answer the following questions in brief :

   (a) Discuss any *two* types of online crimes.

   (b) Why is navigation design crucial for websites and intranets ?

   (c) Discuss the importance of an effective search system on a website.

Unit II

3. What essential hardware is required to establish a stable internet connection for personal and business purposes ? Explain the process of configuring a modem for Internet access. Also, discuss the various Internet service options available to users.

4. Answer any *three* of the following questions in brief :

   (a) Explain, how images and hypertext links are embedded in HTML documents ?

   (b) How do lists, tables and forms enhance the functionality of HTML documents ?

   (c) What are the different formats for specifying styles in CSS ?

   (d) Describe the CSS box model and how does it affect the layout and design of web pages ?

Unit III

5. Explain the concept of a scripting language and how Python fits into this category ? Discuss the various control structures in Python. How do they help in making decisions and managing the flow of execution in a program ?

6. (a) What is recursion in Python ? Provide an example and explain, how it works ?

(b) What are dictionaries in Python, and how do they store data ? How do you perform key-value pair insertion, deletion, and retrieval in a dictionary ?

Unit IV

7. (a) Describe polymorphism in the context of Python.

(b) What is exception handling in Python and why is it important ?

8. (a) How can you check if a file or table exists in a MySQL database using Python ? Provide an example of creating a database table

(b) Explain, how to query a MySQL database using Python ? Use some appropriate examples to illustrate the concept.