BT-4/M-21   **44001**

COMPUTER ARCHITECTURE AND ORGANIZATION
Paper–CSE-202E

Time : Three Hours]   [Maximum Marks : 100

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

UNIT–I

1. (a) What do you understand by Von-Neumann architecture? What is Von-Neumann bottleneck? Discuss.

   (b) What is CISC architecture? What are its advantages over RISC? Discuss.

2. (a) What is Flynn's taxonomy? What is SISD? Can SISD have concurrent processing characteristics? Discuss.

   (b) What are the factors motivating the use of different addressing modes? Discuss the indexed addressing using suitable examples.

UNIT–II

3. (a) What do you understand by the concept of Pipelining? Discuss different areas where this organization is applicable with the help of examples.

   (b) What address sequencing capabilities are required in a control memory? Draw the block diagram of a control memory and the associated hardware for next address generation.

4. (a) Discuss the stack organization of CPU and compare it with accumulator based CPU organization.

   (b) What is micro program sequencer? Explain its working with the help of suitable diagram.

UNIT–III

5. (a) Despite the fact that memory is used to store data or instruction, what is the need of different types of memory? Discuss.

   (b) Write a detailed note on FIFO and LRU page replacement policies.

6. (a) What do you understand by locality of Reference? Explain.

   (b) What is Virtual Memory? What is the difference between Segment and Page? Discuss.

UNIT–IV

7. (a) What is Amdahl's law? Write a note on its use in parallel computing.

 (b) What are the different types of instruction format in 8086? Discuss in detail 1-byte instruction format.

8. What do you understand by throughput enhancement? How pipelining and superscaling are used for throughput enhancement? Explain.

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BT-4/M-21   **44002**

PROGRAMMING LANGUAGE
Paper : CSE-204E

Time : Three Hours]   [Maximum Marks : 100

Note : Attempt *five* questions in all, selecting at least *one* questions from each unit.

UNIT–I

1. (a) Explain compiler and interpreter.   (4)
   (b) Explain different data types, its declarations and its intialization in detail.   (16)

2. What is type checking and type conversions. And general problem for describing the syntax.   (20)

UNIT–II

3. What is structured data objects. Explain the steps to specify and implement structured data type and variable size data structure.   (20)

4. What is subprogram, generic subprogram and overloaded subprogram and also explain with the help of example?   (20)

UNIT–III

5. Explain the following terms with the help of example.

(a) Implicit Sequene Control.

(b) Explicit Sequene Control.

(c) Sequene Control within Statement. (20)

6. Explain static scope, dynamic scope, local data and block data with the help of example. (20)

UNIT–IV

7. What is difference among procedural language, non-procedural language and object oriented language. Explain this with the help of example. (20)

8. What are different methods to control storage management. Explain heap storage management system and static storage management in detail. (20)

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BT-4/M-21   **44003**

OBJECT ORIENTED PROGRAMMING USING C++
Paper : IT-252E

Time : Three Hours]   [Maximum Marks : 100

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

UNIT–I

1. (a) Define object and classes? Differentiate between procedure oriented and object oriented programming.

 (b) Draw comparison between Overloading *vs*. Overriding. Give a brief note on overriding methods.

(10+10=20)

2. (a) What is a Structure? Why we need structure definition? How to access members of Structures?

 (b) Define the 'this' pointer, with an example, indicate the steps involved in referring to members of the invoking object.   (10+10=20)

UNIT–II

3. Write the fundamentals of operator overloading. Draw comparison between operator functions as class members and friend functions. Write a program to overload binary operators.   (20)

4. What is the ambiguity that arises in multiple inheritance? Discuss with examples, the implications of deriving a class from an existing class by the 'public' and 'protected' access specifiers. (20)

UNIT–III

5. (a) Write a C++ program demonstrating use of the pure virtual function with the use of base and derived classes.

    (b) Write a note on dynamic binding. (10+10=20)

6. (a) What is sequential access file? How to read and update data in sequential access file?

    (b) Discuss about stream input, stream output, stream manipulators and stream error states. (10+10=20)

UNIT–IV

7. (a) What are function templates? With an example, show how to overload template functions.

    (b) Write a detailed note on class template and non-type parameters. (10+10=20)

8. (a) What is a user defined exception? Write down the scenario where we require user defined exceptions?

    (b) Draw a comparison between.

        (i) Error and Exception.

        (ii) Exceptions and Inheritance. (10+10=20)

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BT-4/M-21   **44005**

DIGITAL ELECTRONICS (NEW)

Paper–ECE-204E

Time : Three Hours]   [Maximum Marks : 100

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

UNIT–I

1. (a) Convert the following into binary, BCD and excess three codes : 24, 356, 71.   5

  (b) Implement the Boolean expression of X-OR and AND gate using NOR gates.   5

  (c) Perform the following operation : (a) 45-28 using 2's compliment (b) 15-36 using 1's compliment.   5

  (d) Prove the following using Boolean algebric theorems :

  $\overline{A} BC + A \overline{B} C + AB \overline{C} + ABC = AB + BC + CA$

  $(A + B) (C + D) = \overline{\overline{(A + B)} + \overline{(C + D)}}.$ 5

2. (a) Minimize the following expression using K-Map and realist the obtained expression using NAND gates only :

$F(A,B,C,D) = \Sigma m(1,3,5,6,7,13,14,15) + d(0,2,8,9)$ 10

(b) Use Q-M method to minimize $f(A,B,C,D,E)$ $= \Sigma m(0,1,2,5,7,11,15,16,19,21,23,26,28,31)$. 10

UNIT–II

3. (a) What is a multiplexer? Explain the logic diagram and working of 4 : 1 Multiplexer in detail. 6

(b) Explain designing and working of 4 bit BCD adder. 8

(c) Design 8 : 3 encoder. 6

4. (a) Design a three bit synchronous counter. 8

(b) What are flip-flops? Explain race around condition of JK flip-flop. Also describe how it is removed by master slave flip-flop? 8

(c) Explain working of register as ring counter. 4

UNIT–III

5. (a) Write brief note on characteristics of digital logic gates. 10

(b) Explain the working of CMOS NAND and CMOS OR gate. 10

6. (a) Describe working of TTL NAND gate. Explain tri state condition of TTL. 12

(b) Explain how TTL logic gates can be interfaced with CMOS logic gates. 8

UNIT–IV

7. (a) Write down the specification of A/D converters. Explain.

8

    (b) Explain the working of R-2R D/A converter. Mention its limitations. 12

8. Explain the working of (i) counting ADC (ii) Dual slope ADC. 20

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Roll No. ....   Total Pages : 4

BT-4/M-21   **44007**

MICROPROCESSORS AND INTERFACING
Paper–ECE-216E

Time : Three Hours]   [Maximum Marks : 100

Note : Attempt *five* questions, selecting at least *one* question from each section.

SECTION–I

1. (a) Draw the block diagram of 8085 internal architecture and explain the functions of decoding and execution of an instruction. (15)

(b) Draw a logic schematic to generate four control signals using 8085 IO/ M, Rd, WR signals.

   (i) MEMR.

   (ii) MEMW.

   (iii) IOR.

   (iv) IOW.

   Explain the functions of these control signals? (5)

2. (a) Explain Jhe following instructions and show the status of PSW after each execution : (10)

   (i) LDAX B.

   (ii) SHLD, fc90h.

(iii) DAD H.

(iv) XRA, A.

(v) XTHL.

(vi) INR M.

(vii) DAA.

(viii) JM, 16 bit address.

(ix) PUSH D.

(x) OUT, 8-Bit Port address.

(b) Interface two 4k * 16 EPROM and two 4k * 16 RAM chips with 8085 and also show the complete circuit of the design. (10)

SECTION–II

3. (a) Draw and explain the relevant pin diagram for 8086 microprocessor. (10)

(b) Draw and explain the timing diagram for an input operation in MX Mode of 8086. (10)

4. (a) Write down the addressing modes for the following instructions and calculate the physical address for the same making use of the given data Ax = fc39h, bx = 273f h, cx = 001a, dx = 4b2c, si = 60bc h, bp = 6000h, sp = 4000h, di = fc32h, cs = 4000h, ds = 3000h, es = l000h, ss = 8000h, displacement = 0010h.

(1) Mov al, bh.

(2) Mov bl, [bp].

(3)   Mov cx, [1234]

(4)   Mov dx, 1234h

(5)   Mov cx, disp [si]

(6)   Mov al, [bx] [di]

(7)   mov cx, disp[bx] [si] ?   (12)

(b)   Generate the HEX codes for the following instructions

Mov Ds:0F246H [BP], Dx

Mov [0874], Bx.   (8)

SECTION–III

5. (a)   Interface DAC with an 8086 microprocessor running at 10 MHz speed and write an ALP to generate a saw tooth waveform of period 5 ms with V_{max} 2v ?   (10)

(b)   Draw the internal architecture of 8255 chip and explain all the working modes of 8255 in detail?   (10)

6. (a)   Write an ALP to change a sequence of 16, 2-byte numbers from ascending to descending order. Store the new series at the starting address of 2000h. Use the LIFO property of the stack?   (10)

(b)   Interface a 4*4 keyboard with 8086 using 8255 and write ALP for detecting a key closure and return the key code in AL. The debouncing period for key is 20 ms.   (10)

SECTION–IV

7. (a) Write down the steps involved when an interrupt INT 42h is encountered in the main program and calculate address of ISR for this interrupt? (10)

(b) Draw the block diagram of 8259 chip and discuss its Initialization command words in detail? (10)

8. Explain briefly the following :

(a) 8237 chip. (10)

(b) Pipelining. (10)

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BT-4/M-21   **44120**

MATHS-III
Paper–AS-201N

Time : Three Hours]   [Maximum Marks : 75

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

UNIT–I

1. (a) Expand $f(x) = x - x^2$ as a Fourier series in the interval $-\pi$ to π.   7½

 (b) Expand $f(x) = |\cos x|$ as a Fourier series in the interval $(-\pi, \pi)$.   7½

2. (a) Find the Fourier sine transform of $\dfrac{e^{-ax}}{x}$.   7½

 (b) Using Parseval's identity, prove that $\displaystyle\int_0^\infty \dfrac{dx}{(x^2 + 1)^2} = \dfrac{\pi}{4}$.

                    7½

UNIT–II

3. (a) Form the partial differential equations (by eliminating the arbitrary functions) from $z = f(x + at) + g(x - at)$.

                    5

(b) Find the complete integral of $z = px + qy + p^2 + q^2$ using Charpit's method where $p = \dfrac{\partial z}{\partial x}$, $q = \dfrac{\partial z}{\partial y}$.　　10

4. Solve the following linear programming problem by Simplex method

Maximize　　$Z = 4x_1 + 10x_2$

subject to

$$2x_1 + x_2 \leq 50$$
$$2x_1 + 5x_2 \leq 100$$
$$2x_1 + 3x_2 \leq 90$$
$$x_1, x_2 \geq 0 \qquad\qquad 15$$

UNIT–III

5. (a) If $\cos(\theta + i\phi) = \cos \alpha + i \sin \alpha$ prove that $\sin^2 \theta = \pm\sin \alpha$.　　7½

(b) Find the analytic function whose imaginary part is

$$\frac{x - y}{x^2 + y^2}.$$　　7½

6. (a) Evaluate $\displaystyle\oint_C \frac{\sin^2 z}{\left(z - \dfrac{\pi}{6}\right)^3} \, dz$ using Cauchy's integral formula, where C is the circle $|z| = 1$.　　7½

44120//KD/1422　　　　2

(b) Find Taylor's expansion of $f(z) = \dfrac{1}{(z+1)^2}$ about the

point $z = -i$. 7½

UNIT–IV

7. (a) If the probability of a bad reaction from a certain injection is 0.001. Determine the chance that out of 2000 individuals more than two will get a bad reaction.

7½

(b) A pair of dice is tossed twice. Find the probability of scoring 7 points (i) once (ii) at least once (iii) twice.

7½

8. (a) X is normal variate with mean 30 and standard deviation 50. Find the probabilities that (i) $26 \leq X \leq 40$
(ii) $X \geq 45$ (iii) $|X - 30| > 5$. 10

(b) If $P(A) = \dfrac{1}{4}$, $P(B) = \dfrac{1}{3}$ and $P(A \cup B) = \dfrac{1}{2}$. Evaluate

(i) P(A|B) (ii) P(B|A) (iii) $P(A \cap B')$. 5

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BT-4/M-21   **44181**

BASICS OF COMMUNICATION
Paper–ES-IT-202A

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 understand by communication system? Draw the block diagram of a communication system and discuss in brief the functionalities of different elements in it.

2. What is noise in communication system? What are the different types of it? Discuss in brief the different noise mitigation techniques.

UNIT–II

3. What is modulation? What is the need of it? What is Armstrong Phase Modulator? Explain.

4. Compare AM (Amplitude Modulation) and FM (Frequency Modulation). Also discuss their pros and cons.

UNIT–III

5. What do you understand by Frequency Modulation and demodulation? What is FM slope detector? What are the advantages and disadvantages of FM slope detection.

6. What do you understand by Intermediate Frequency (IF)? What are the reasons of using it? Differentiate between RF and IF Frequency and Amplifiers.

UNIT–IV

7. (a) Discuss the factors that are responsible for generating attenuation of optical power in fiber.

   (b) What are the benefits of optical fiber cable? Discuss.

8. (a) What is the difference between Single Mode and Multi Mode Fiber? Explain.

   (b) Differentiate between LD's and LED's emitters.

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BT-4/M-21   **44182**

DISCRETE MATHEMATICS
Paper–PC-IT-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) Show that

$$1^3 + 2^3 + 3^3 + ... + n^3 = \left[\frac{n(n+1)}{2} \right]^2 .$$

by mathematical induction.

(b) Construct the truth tables for the following statements. (any two out of three)

(i) $p \rightarrow p$.

(ii) $(p \rightarrow p) \vee (p \rightarrow \overline{p})$.

(iii) $(p \rightarrow (q \rightarrow r)) \rightarrow ((p \rightarrow q) \rightarrow (p \rightarrow r))$.

2. (a) If A, B, C be arbitrary sets, prove that

(i) $(A \cap B) \subseteq B \subseteq (A \cup B)$.

(ii) $(A \cap B) \subseteq A \subseteq (A \cup B)$.

(b) Out of 200 students, 50 of them take the course Discrete Mathematics, 140 of them take the course Economics, and 24 of them take both courses. Since both courses have scheduled examinations for the following day,

only students who are not in either one of these courses will be able to go the party the night before. Find how many students will be at the party ?

UNIT–II

3. (a) Let A = {1, 2, 3} and B = {r, s}, find A × B and B × A and verify A × B ≠ B × A.

(b) Define the following :
   (i) Reflexive relation.
   (ii) Anti-symmetric relation.
   (iii) Transitive relation.

4. (a) Let R be the relation from A to B, and let A_1 and A_2 be subsets of A. Prove that
   (i) If $A_1 \subseteq A_2$ then $R(A_1) \subseteq R(A_2)$.
   (ii) $R(A_1 \cap A_2) \subseteq R(A_1) \cap R(A_2)$.

(b) Let R and S be relations on a set A. Prove that
   (i) If R is reflexive, so is R^{-1}.
   (ii) If R and S are reflexive, then so are $R \cap S$ and $R \cup S$.

UNIT–III

5. (a) Prove that if $f : A \rightarrow B$ and $g : B \rightarrow C$ are onto functions, then g o f (composition function of g and f) is onto.

(b) Suppose that repetitions are not permitted. How many four-digit numbers can be, formed from the six digits 1, 2, 3, 5, 7, 8 and how many of them are less than 4000?

6. (a) Solve the recurrence relation $a_{r+2} - 2a_{r+1} + a_r = 2^r$ by method of generating functions with initial conditions $a_0 = 2$ and $a_1 = 1$.

(b) State and prove Pigeon hole Principle.

UNIT–IV

7. (a) Define the following :

(i) Semi group.

(ii) Monoid.

(iii) Group.

(b) Consider an algebraic system (G, *), where G is set of all Non-zero real numbers and * is binary operation defined by $a*b = \dfrac{a.b}{4}$. Show that (G, *) is an Abelian group.

8. (a) Prove that every subgroup of a cyclic group G is Cyclic.

(b) Let R is a ring with unity and $(x.y)^2 = x^2 .y^2 \ \forall x, y \in$ R. Show that R is a commutative ring.

BT-4/M-21   **44183**

OPERATING SYSTEMS
Paper–PC-IT-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. (a) Identify the prime objectives of using scheduling. How SJF and priority based scheduling work? Briefly explain each of them.   8

    (b) Give the real time justification of using preemptive *versus* non-preemptive scheduling.   7

2. (a) Discuss the roles of using systems calls and system programs for the effective implementation of operating systems services modules.   8

    (b) Elaborate the roles of interrupts in operating systems. Discuss the technicalities of using various interrupts mechanisms in operating systems.   7

UNIT–II

3. (a) Explain and justify the roles of the following :

      (i) Producer-Consumer Problem.   4

      (ii) Banker's Algorithm.   4

(b) What do you mean by Mutual exclusion? Explain Dekker's solution and Peterson's solution for mutual exclusion. 7

4. (a) Define the Deadlock states. Explain the scientific procedures of the following : 5

    (i) Deadlock Recovery.

    (ii) Deadlock Prevention.

(b) Explain and substantiate the concept of inter-process communication in operating systems. 5

(c) Explain and substantiate the concept of detection and recovery in Deadlocks. 5

UNIT–III

5. (a) Explain the role of multiprogramming with fixed, variable and virtual partitions. 8

(b) What is a page-fault? List all the steps of how a page-fault is serviced by the operating system. 7

6. (a) The following is the sequence of page requests :

       1, 2, 4, 5, 4, 3, 2, 5, 2, 2, 4, 5.

Assume that there are three frames. Now, how many page faults will occur if MFU and LRU algorithms are used to replace pages? 10

(b) Explain the difference between segmented paging and paged segmentation. 5

UNIT–IV

7. (a) Recognize the importance for employing dedicated devices and shared devices under device management.

8

(b) Draw and explain the flow of activity that takes place during a remote procedure call (RPC) between two networked systems.

7

8. (a) Write short notes on the following :

(i) Disk Space Management.

(ii) Block Allocation.

(iii) Free Space Management.

8

(b) What is basic role of software and hardware in the security of distributed file systems? How will the distributed file systems be protected from an unauthorized use and virus attacks?

7

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BT-4/M-21

44184

MICROPROCESSOR INTERFACING AND APPLICATIONS

Paper–PC-IT-208A

Opt. : (I)

Time : Three Hours]   [Maximum Marks : 75

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

UNIT–I

1. (a) Explain the architecture, dataflow and instruction execution of 8085 microprocessor.   8

(b) With timing diagram, explain the memory read operation in 8085 microprocessor.   7

2. (a) Draw the pin diagram of 8085 microprocessor.   8

(b) Explain the operation of stack in 8085 microprocessor using an example.   7

UNIT–II

3. (a) Write an assembly language program based on 8085 microprocessor instruction set to search the smallest data in a set.   7

(b) With suitable example, discuss about 8085 microprocessor instructions used for data manipulation.

8

4. (a) Draw the timing diagram for IN and OUT instruction of 8085 and explain. 9

    (b) Mention all the categories of instructions and give two example for each category. 6

UNIT–III

5. (a) Compare the I/O mapped and memory mapped interfacing.

    (b) Explain in detail the 8085 interrupt structure.

6. Design a microprocessor system to interface an 8K × 8 EPROM and 8K × 8 RAM. 15

UNIT–IV

7. Draw the block diagram of 8255 programmable peripheral interface and its working. Explain control word definition of the same. 15

8. (a) Write an assembly language program to interface a matrix keyboard with 8085 microprocessor. 8

    (b) Explain the microprocessor controlled temperature system. 7

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BT-4/M-21   **44185**

DATA BASE MANAGEMENT SYSTEM
Paper–PC-IT-210A

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 different types of Database Users? Discuss. Explain the responsibilities of Database Administrator (DBA).

    (b) What is role of mapping in three-tier architecture of Data Base Management System (DBMS)? Discuss Data Independence.   (8+7=15)

2. Write note on the following :

    (a) Composite Key and Unique Key.

    (b) Single valued and Multivalued attributes.

    (c) Integrity Rule-1 and Integrity Rule-II.

    (d) Specialization and Generalization.

                                           (3+4+4+4=15)

UNIT–II

3. (a) Consider following schema and write SQL for given statements.

Student(Rollno,Name,Age,Sex,City)Student_marks (Rollno,Subl,Sub2,Sub3,Total,Average).

Write query to

   (i) Calculate and store total and average marks from Subl, Sub2 & Sub3.

   (ii) Display name of students who got more than 60 marks in subject Sub1.

   (iii) Display name of students with their total and average marks.

   (iv) Display name of students who got equal marks in subject Sub2.

   (b) What are Views? Write the syntax to create, delete and modify view.   (8+7=15)

4. (a) What is the difference between tuple relational calculus and domain relational calculus?

   (b) What is the need of relational algebra? Explain set oriented operation with their meaning, syntax and example.   (8+7=15)

UNIT–III

5. (a) Given relation R with attributes A, B, C, D, E, F and set of FDs as A -> BC, E -> CF, B -> E and CD -> EF. Find out closure {A, B} + of the set of attributes,

(b) Differentiate between Full and Partial Functional Dependency & Multivalued and Join Functional Dependency. (8+7=15)

6. Why normalization is needed? Discuss Second Normal Form (2NF) and Fifth Normal Form (5NF) with suitable example.
15

UNIT–IV

7. (a) What is concurrency? Briefly explain the methods to control concurrency.

   (b) Explain conflict serializability and view serializability. (8+7=15)

8. (a) Explain log-based recovery and shadow paging technique.

   (b) What is deadlock? Explain three types of actions to be taken for recovery from deadlock. (8+7=15)

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BT-4/M-21   **44186**

MANAGEMENT INFORMATION SYSTEM

Paper–HM-901-A

Time : Three Hours]   [Maximum Marks : 75

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

UNIT–I

1. What are major components of an information system (IS). What is role of MIS in functioning of business organisation ?

15

2. Write notes on :

(a) Limitations of MIS.

(b) Characteristics of MIS.

(c) Finance function.   (5+5+5=15)

UNIT–II

3. Explain the different levels of management along with their information needs.   15

4. Write short notes on :

    (a) Determinants of quality of information.

    (b) Ethical issues and social impact of IS.   (7+8=15)

UNIT–III

5. Discuss the application of information system and information technology in the functional area of finance.   15

6. Write note on :

    (a) Internet and Extranet in business.

    (b) Artificial Intelligence in business.   (7+8=15)

UNIT–IV

7. Write short notes on :

    (a) Management of data resources.

    (b) Networking.

    (c) Strategic information system.   (5+5+5=15)

8. What is Decision Support System (DSS) ? Explain its components and characteristics.   15

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BT-6/M-21　　　　**46017**

ANALYSIS AND DESIGN OF ALGORITHMS
Paper–IT-352

Time : Three Hours]　　　　　　[Maximum Marks : 100

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 rules of manipulate Big-OH expression and about the typical growth rate of algorithms?

(b) What is an algorithm? Write the properties of an algorithm? How do you perform run time analysis of algorithms?　　　　(10+10=20)

2. (a) Compute the multiplication of given two matrix using Strassen's matrix multiplication method :

$$A = \begin{bmatrix} 1 & 0 & 2 & 1 \\ 4 & 1 & 1 & 0 \\ 0 & 1 & 3 & 0 \\ 5 & 0 & 2 & 1 \end{bmatrix} \quad B = \begin{bmatrix} 0 & 1 & 0 & 1 \\ 2 & 1 & 0 & 4 \\ 2 & 0 & 1 & 1 \\ 1 & 3 & 5 & 0 \end{bmatrix}.$$

(b) Explore the divide and conquer algorithms. How do you analyze divide and conquer run time recurrence relations?　　　　(10+10=20)

UNIT–II

3. (a) What is Greedy method/algorithm? Does it always give an optimal solution? Give argument to support your answer.

(b) Write a note on single source shortest paths.

(13+7=20)

4. (a) What is dynamic programming? Draw a comparison between dynamic programming and divide and conquer. Explain with an example.

(b) What do you mean by longest common sequence?

(13+7=20)

UNIT–III

5. (a) Find the optimal solution to the Fractional Knapsack problem with given data :

Item	Weight	Benefit
A	2	60
B	3	75
C	4	90

(b) What is back tracking? Write a detailed note on 8-queen problem. (10+10=20)

6. (a) Find the optimal solution using Branch and Bound for the following assignment problem :

	Job 1	Job 2	Job 3	Job 4
A	9	2	7	8
B	6	4	3	7
C	5	8	1	8
D	7	6	9	4

(b) Outline an exhaustive search algorithm to solve travelling salesman problem. (10+10=20)

UNIT–IV

7. (a) Describe binary search tree with three traversal patterns. Give suitable example with neat diagram for all three traversal of binary search tree.

(b) Differentiate between depth first and breadth first search. (13+7=20)

8. (a) Differentiate between polynomial *vs* non-polynomial time complexity.

(b) Write note on Class P, Class NP and NP hard problem. (10+10=20)

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BT-6/M-21   **46019**

COMPUTER GRAPHICS

Paper–IT-356

Time : Three Hours]   [Maximum Marks : 100

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

UNIT–I

1. What are the various circle drawing algorithms in Computer Graphics? Write and explain algorithm for each and also compare these methods.   (20)

2. (a) Write and explain a polygon filling algorithm in computer graphics.   (10)

    (b) Discuss the various pointing devices used in computer graphics.   (10)

UNIT–II

3. (a) What is meant by viewing pipeline? Explain the concept of window-to-viewport mapping.   (10)

    (b) Explain the Cohen-Sutherland algorithm for line-clipping with appropriate example.   (10)

4. What is polygon clipping? Write and explain the Sutherland-Hodgeman Polygon clipping algorithm in detail. (20)

UNIT–III

5. (a) How three-dimensional viewing is different from two-dimensional viewing? Explain in detail. (10)

(b) How can you perform scalling and reflection in two-dimensional geometric transformations? Explain using suitable examples. (10)

6. (a) Explain the concept of perspective projections in three-dimensional viewing. Also find the transformation matrix for perspective projection. (10)

(b) Write short notes on :
(i) Homogeneous Coordinate System.
(ii) Raster Graphics. (10)

UNIT–IV

7. What are the various methods for hidden surface removal? Explain any *two* method in detail. (20)

8. (a) What is GKS? Write and explain its various components in detail. (10)

(b) Discuss the major properties of Bezier curves. (10)

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BT-6/M-21   **46154**

ANALYSIS AND DESIGN OF ALGORITHMS
Paper–IT-302 N

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 understand by problem solving techniques? How to measure the complexity of an algorithm in asymptotic notation? Explain using suitable examples.

2. (a) What do you mean by Recurrence relations? How it is solved using back substitution method?

   (b) What is sorting of objects? Explain the quick sort techniques of sorting using suitable examples.

UNIT–II

3. (a) State the per-requisites and applications of Greedy method using suitable examples.

   (b) Explain the Dijkstra method to find Shortest path in a given graph.

4. (a) What do you mean by Sob-Problem Overlapping? How it is used in Dynamic programming?

(b) Explain the Optimum Sub-Structure property of Dynamic programming using suitable examples.

UNIT–III

5. What is backtracking? Show how to solve puzzles using backtracking using suitable examples of Sudoku etc.

6. (a) What do you mean by FIFO Branch and Bound?

(b) Solve 0/1 Knapsack problem using Branch and Bound method.

UNIT–IV

7. Differentiate between :

(a) Depth First Search and Breadth First Search.

(b) B Tree and B+ tree.

8. What do you mean by Complexity Classes? Explain polynomial and non-polynomial time complexity classes using suitable examples.

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Roll No. ....   Total Pages : 3

BT-6/M-21   **46211**

SOFTWARE ENGINEERING
Paper-PC-IT-302A

Time : Three Hours]   [Maximum Marks : 75

Note : Attempt *five* questions in all, selecting at least *one* question from each of the four Section (A to D). All questions carry equal marks.

SECTION–A

1. (a) Elucidate the key features of the software process models with suitable examples.   (8)

    (b) What is the role of user participation in the selection of a life cycle model?   (7)

2. (a) Explain the need of software life cycle models in Software Engineering.   (7)

    (b) What are the advantages and disadvantages of Waterfall Model of software life cycle?   (8)

SECTION–B

3. What is Risk? How will you define and categorize it, and what are the various risks that will happen from initialization phase of a software development to product delivery? Also, explain how you will manage those risk in various phases?   (15)

46211/00/KD/1554   [P.T.O.

4. (a) Discuss about COCOMO II model for software estimation. (8)

(b) Explain the steps involved in project planning. (7)

SECTION–C

5. Explain the steps involved in conducting component level design when it is applied for object-oriented system. (15)

6. Consider the process of ordering a pizza over the phone. Draw the use case diagram and also sketch the activity diagram representing each step of the process, from the moment you pick up the phone to the point where you start eating the pizza. Include activities that others need to perform. Add exception handling to the activity diagram you developed. Consider at least two exceptions (e.g., delivery person wrote down address, delivery person brings wrong pizza). (15)

SECTION–D

7. (a) Compare and contrast alpha and beta testing. (7)

(b) Consider a program for determining the previous date. Its input is a triple of day, month and year with the values in the range $1 \leq$ months ≤ 12, $1 \leq$ day ≤ 31, $1990 \leq$ year ≤ 2020. The possible date or invalid input date. Design the boundry value test cases. (8)

8. List out the various umbrella activities which support development process and discuss about their necessity in maintaining the quality in both software process and product that is being developed for railway reservation system.

(15)

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BT-6/M-21   **46212**

LINUX OPERATING SYSTEM
Paper–PC-IT-304A

Time : Three Hours]   [Maximum Marks : 75

Note : Attempt *five* Questions, selecting at least *one* question from each unit.

UNIT–I

1. (a) What is semi-automatic system installation?   (7)

   (b) What is rebooting process and write the steps involved in shutting down the process ?   (8)

2. (a) How Linux kernel provide support for 'Signals' and write about kill, raise, alarm, pause, abort and sleep functions used in Linux signals ?   (8)

   (b) Explain the disc partitioning.   (7)

UNIT–II

3. Explain the following terms :

   (a) NIS server

   (b) NFS server

   (c) IPv4 address

   (d) telnet

   (e) ftp   (15)

4. What is Network file system? Explain the two important NFS configuration files for using the features of NFSv4. (15)

UNIT–III

5. (a) What is Samba? What is the security or authentication mode for Samba server? (8)

(b) What are the major differences between Windows 2000 and Linux operating system? (7)

6. (a) Write startup and all run levels of Linux OS. (7)

(b) Write a shell script to count the number of lines in a text file without using 'wc' command. (8)

UNIT–IV

7. (a) What are the different types of DNS server used in Linux OS? (7)

(b) Explain the procedure or steps for E-mail transaction with the help of diagram. (8)

8. Explain the following :

(a) NAT

(b) DMZ

(c) IP-firewalls

(d) PGP/GPG

(e) SMTP (15)

BT-6/M-21   **46215**

BIG DATA ANALYTICS
Paper-PE-IT-S306A

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 is Big data? Discuss the main characteristics of Big data. How does Big data analytics work? State the skills required for Big data analytics. (15)

2. Explain concept of MapReduce using an example. Write MapReduce pseudocode for matrix vector multiplication. (15)

UNIT–II

3. Differentiate between Hadoop and Apache Hadoop. Why Apache Hadoop is uded for? Discuss the essential way of transferring data in and out in Hadoop. (15)

4. Which input format is mostly used in MapReduce? How does Hadoop MapReduce data flow work a word count program? Give an example. (15)

UNIT–III

5. (a) Outline and explain Hadoop architecture.

   (b) Explain HDFS Name Node Federation, MFS Gateway, Snapshots, Checkpoint and Backups. (8+7=15)

6. (a) Write and explain mapper and reducer scripts for the MapReduce model.

   (b) What is SSH in Hadoop? Write the steps to configure SSH for Hadoop. (8+7=15)

UNIT–IV

7. Explain the components that collectively form a Hadoop ecosystem. How capacity schedulers are different from fair schedulers? (15)

8. Explain the following :

   (a) YARN (MRv2) Resource Manager High Availability.

   (b) MapReduce (MRv1) Job Tracker High Availability.

   (8+7=15)

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Roll No. ....   Total Pages : 2

BT-6/M-21   **46216**

ANALYSIS AND DESIGN OF ALGORITHM
Paper : PE-IT-S310A

Time : Three Hours]   [Maximum Marks : 75

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

UNIT–I

1. (a) What are different Asymptotic Notation of representing
         the complexity of any algorithm?   (5)
    (b) Find 30 in following data using binary search algorithm
         and also write steps in detail.
              20, 10, 500, 30, 40, 100.   (10)

2. Write an algorithm to sort the data using Quick sort Algorithm
    and explain it with the help of example.   (15)

UNIT–II

3. What is use of minimum cost spanning tree algorithm and
    also explain it with the help of example?   (15)

4. What is difference between Dynamic and Divide and
    Conquer algorithm? Explain Longest common sequence Algo
    with the help of example.   (15)

UNIT–III

5. Explain the following problem with the help of example and Algo :

    (a) Knapsack Problem.

    (b) 8-Queen Problem.   (15)

6. Explain Travel salesman problem with the help of example of Branch and Bound Algorithm.   (15)

UNIT–IV

7. What is difference between Graph and Tree implementation. Explain Depth First Search (DFS) Algo with the help of example.   (15)

8. What is difference between Binary tree and B++ tree. Write an algorithm to insert and delete data at any point in a binary tree and also explain it with the help of example.

                        (15)

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Roll No. .... Total Pages : 2

BT-6/M-21 **46217**

MOBILE COMPUTING
Paper-PE-IT-S312A

Time : Three Hours] [Maximum Marks : 75

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

UNIT–I

1. (a) Describe mobile computing architectural layers. (7)

(b) What is the frequency allocation problem in cellular architecture? How is it solved? (8)

2. (a) What are different location management schemes? Describe in detail. (8)

(b) Explain the basic working of GSM. (7)

UNIT–II

3. (a) Explain role of L2CAP of Bluetooth. What are the characteristics of ACL and SCO links? (9)

(b) Discuss issues in Wireless networking that make it more challenging than wired LANs. (6)

4. (a) What is the difference in the working of classical TCP and TCP in Wireless systems. (6)

(b) What are the requirements of Wireless application environment? Explain the concept of WAP Push framework and WAP gateways. (9)

UNIT–III

5. (a) Explain adaptive clustering for Mobile wireless networks. (8)

   (b) Describe various types of clouds and their distinctive features. (7)

6. (a) What are security threats in Mobile systems? Explain solutions for fault tolerance. (8)

   (b) What are the issues in data processing in cloud? How to handle big amounts of data? Discuss methods. (7)

UNIT–IV

7. (a) What are the differences in the working of AODV and DSR? (6)

   (b) Explain working of TORA. (9)

8. (a) Describe different catagories of routing protocols in Mobile adhoc networks. (9)

   (b) What is the concept of Sequence numbers in DSDV? Discuss. (6)

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Roll No. ....   Total Pages : 2

E-COMMERCE

Paper-OE-IT-306A

Time : Three Hours]   [Maximum Marks : 75

Note : Attempt *five* questions in all, selecting at least *one* question
from each of the four Sections (A-D). All questions carry
equal marks.

SECTION–A

1. (a) How E-Commerce is different from traditional
         Commerce?   (7)

    (b) Highlights the salient features and limitations of
         E-Commerce.   (4+4)

2. (a) Explain the facrots influencing success of E-Commerce.
                                                     (8)

    (b) Explain the E-Commerce framework and its anatomy
         of applications.   (7)

SECTION-B

3. What do you understand by EDI? Is EDI used in B2C or
    B2B E-Commerce? Why is EDI important in E-Commerce?
                                                   (5+3+7)

4. (a) Explain the components of the Information superhighway infrastructure. (8)

(b) Explain the EDI application in business. (7)

SECTION–C

5. Why is security issues important in E-commerce? What are the security issues to be taken into account while designing a security system for E-commerce? Explain.

(5+10)

6. What is DES? Explain what DES does when the following hexadecimal plain text is input to a DES Hardware : A1907FBCD986543201FED14E890ABCA5. (5+10)

SECTION-D

7. (a) Explain the types of electronic payment systems are required in E-commerce. Why are there different types of payment systems? Explain with example. (5+3)

(b) What are the main differences between electronic cheque payment and credit care payment in E-Commerce? Explain cheque transaction protocol used in E-Commerce. (7)

8. (a) Explain SET protocol used in credit card transactions. What is the main interesting aspect of SET protocol which gives confidence to customers transacting business using the internet? (4+4)

(b) In using SET protocol who has to keep a data base of public keys of all customers? How the customer does assure that he will not be double charged for the same item purchased? (3+4=7)

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BT-7/M-21: 47023
COMPILER DESIGN
IT-455

Time : Three Hours]   [Maximum Marks : 75

Note : Attempt *Five* questions in all. Q. No. **1** is compulsory. In addition to that attempt *four* more questions selecting exactly *one* question from each Unit.

Unit I

1. What are the various compiler construction tools ? Explain in detail.   **15**

2. Draw a flow diagram for showing the phases of a compiler and discuss each phase in detail.   **15**

Unit II

3. (a) Describe the role of a parser in a compiler. How different types of errors can be handled by a parser ?

                                                                            8

    (b) Differentiate between regular expression and CFG.

4. (a) Write down an algorithm for detecting unreachable entries in a LR parsing table.

(b) Construct error-correcting LR parser for the following grammar : **7.5**

stmt → *if e then* stmt
| *if e then* stmt *else* stmt
| *while e do* stmt
| *begin* list *end*
| s

list → list; stmt
| stmt **7.5**

Unit III

5. (a) Give a syntax-directed definition to translate infix expression into infix expression without redundant parentheses. For example, since + and * associative to the left, ((a*(b+c)*(d)) can be rewritten as a*(b+c)*d. **5**

(b) What do you understand by three-address code ? Explain common three-address statement in use. **7**

(c) What do you understand by symbol table ? **3**

6. What do you mean by lexical, syntactic and semantic errors ? How can these errors be detected and recovered ? Explain the various schemes for error detection and recovery. **15**

Unit IV

7. What is loop optimization ? Explain various kinds of loop optimization with the help of suitable examples. **15**

8. (a) What is peephole optimization ? Explain in brief. **7.5**

(b) What do you mean by data-flow analysis ? Explain using suitable examples. **7.5**