

Total No. of Questions : 4]

SEAT No. :

PE-1497

[Total No. of Pages : 2

[6502]-1

F.Y. B.Sc. (Computer Science)

CS-101-T : PROBLEM SOLVING USING C
PROGRAMMING

(Rev. 2024) (Semester - I)

Time : 2 Hours]

[Max. Marks : 30

Instructions to the candidates:

- 1) Figures to the right indicate full marks.
- 2) All questions are compulsory.

Q1) Attempt any six of following :

[6 × 1 = 6]

- a) Define an Identifier.
- b) What is the use of == operator?
- c) What is flowchart?
- d) What is the use of scanf?
- e) Write the syntax to define the function.
- f) Define an Array.
- g) List the various unconditional program control statement.
- h) Define the term 'Local Variable'.

Q2) Attempt any 4 of the following :

[4 × 2 = 8]

- a) What is the difference between while loop and do-while loop?
- b) What are the rules of naming the identifiers in C Language?
- c) List various data types in C-Language along with their size.
- d) What is the difference between one-D array and two-D array?
- e) What is the use of break and continue statements?

P.T.O.

Q3) Attempt any 2 of the following :

[2 × 4 = 8]

- a) Define the term Algorithm. Write an algorithm that will display the table of the given number.
- b) What is Parameter? What are the types of Parameter? List the rules of parameter passing.
- c) Write the syntax and working of for loop with examples.

Q4) Attempt any 2 of the following :

[2 × 4 = 8]

- a) Write a program to accept 3 integers and display the sum of greatest and smallest number.
- b) Write a recursive function to find the factorial of a given number.
- c) Explain the use of following operators ++, <<, != and &&



Total No. of Questions : 4]

SEAT No. :

PE-3043

[Total No. of Pages : 2

[6502]-2

F. Y. B.Sc. (Computer Science)

ELECTRONICS

ELC-101-T: Principles of Analog Electronics

(Rev. 2024) (Semester - I)

Time : 2 Hours]

[Max. Marks : 30

Instructions to the candidates :

- 1) All questions are compulsory.
- 2) Figures to the right indicate full marks.
- 3) Draw neat and labelled diagram wherever necessary.
- 4) Use of scientific calculator are allowed.

Q1) Answer the following questions (any 5) :

[5 × 1 = 5]

- a) What do you mean by doping?
- b) Draw symbol of PNP and NPN transistor.
- c) What is relation between '3' currents of transistor?
- d) Give the material used for making crystal oscillator.
- e) What is accuracy with respect to DAC?
- f) What is difference between active and passive sensor?
- g) Define range with respect to sensors.

P.T.O.

Q2) Answer the following questions (any 5) :

[5 × 2 = 10]

- a) Define step angle of stepper motor. Find number of steps for one rotation if step angle is 36° .
- b) Derive relation of α in terms of β .
- c) Explain working principle of zener diode in brief.
- d) Explain the action of pn-junction diode when forward bias is applied to it.
- e) Define oscillator. State Barkhausen criteria for sustained oscillations.
- f) Find output voltage of R-2R ladder type DAC if binary input is 1010 and $V_{ref}=12V$.
- g) Explain working principle of thermistor.

Q3) Answer the following questions (any 2) :

[2 × 5 = 10]

- a) What is the need of ADC and DAC in instrumentation system. Explain any three parameters of ADC.
- b) Give at least 5 points to distinguish between CC, CB and CE configurations.
- c) Write any 5 ideal characteristics of op-amp.

Q4) Answer the following questions (any 2) :

[2 × 2½ = 5]

- a) What is dark current with respect to photodiode. Draw symbol of photodiode and give its two applications.
- b) Draw and explain block diagram of instrumentation system.
- c) Explain the concept of virtual ground in op-amp.
- d) Draw circuit diagram of Wein bridge oscillator and find frequency of it. If $R=5k\Omega$ and $C=0.01\mu F$



Total No. of Questions : 3]

SEAT No. :

PE-1498

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F.Y. B.Sc. (Computer Science)

MATHEMATICS

MTC-101-T: Matrix Algebra

(NEP) (Rev. 2024) (Semester - I)

Time : 2 Hours]

[Max. Marks : 30

Instructions to the candidates:

- 1) Figure to the right indicate full marks.
- 2) All questions are compulsory.
- 3) Use of single memory non programmable scientific calculator is allowed.

Q1) Attempt any five of the following.

[5 × 2 = 10]

- a) Define symmetric matrix. Give one example of symmetric matrix.
- b) If $A = \begin{bmatrix} 8 & 6 \\ 5 & 4 \end{bmatrix}$, then find determinant of matrix A.
- c) State any two properties of determinant.
- d) For the following system of linear equation, write the matrix form $AX = B$
 $5x + 3y + 7z = 4$
 $3x + 26y + 2z = 9$
 $7x + 2y + 10 = 5$
- e) If $A = \begin{bmatrix} 0 & 1 \\ -1 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 5 & 1 \\ -2 & 3 \end{bmatrix}$, then find $5A + 3B$.
- f) If A is 5×7 matrix and nullity (A) = 4, then find rank of A.
- g) Describe the nature of solution for the following system of linear equation.

$$x + 2y = 5$$

$$7x + 14y = 35$$

P.T.O.

Q2) Attempt any two of the following.

[2 × 5 = 10]

- a) Verify that $\det(A, B) = \det(A) \det(B)$ for the following matrices.

$$A = \begin{bmatrix} 1 & 1 \\ -1 & 3 \end{bmatrix} \text{ and } B = \begin{bmatrix} 4 & 2 \\ -2 & 3 \end{bmatrix}$$

- b) By elementary row transformation, reduce the following matrix into

row Echelon form. $A = \begin{bmatrix} 1 & 2 & 1 \\ 3 & 2 & 3 \\ 1 & 1 & 2 \end{bmatrix}$

- c) Use Cramer's rule of compute system of linear equation

$$2x + 8y = 18$$

$$2x + 2y - 3z = 3$$

$$x + 2y + 7z = 12$$

- d) Find the inverse of Matrix $A = \begin{bmatrix} 2 & 1 & 3 \\ 1 & -1 & 1 \\ 1 & 4 & -2 \end{bmatrix}$ by adjoint method.

Q3) Attempt any one from the following.

[1 × 10 = 10]

- a) Use LU-Decomposition of A to solve $AX = b$ where

$$A = \begin{bmatrix} 3 & -7 & -2 \\ -3 & 5 & 1 \\ 6 & -4 & 0 \end{bmatrix} \text{ and } B = \begin{bmatrix} -7 \\ 5 \\ 2 \end{bmatrix} \text{ and } X = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$$

- b) i) Solve the following system of equation by Gauss elimination method.

$$x + 2y + 3z = 1$$

$$4x + 5y + 6z = 2$$

$$7x + 8y + 9z = 0$$

- ii) Find the inverse of the matrix $A = \begin{bmatrix} 1 & -2 & -1 \\ -1 & 5 & 6 \\ 5 & -4 & 5 \end{bmatrix}$, If it exist. Use row transformation method.



Total No. of Questions : 5]

SEAT No. :

PE-5000

[Total No. of Pages : 2

[6502]-101

S.Y. B.Sc.

COMPUTER SCIENCE

CS-201-IKS-T : Indian Knowledge System in Computing

(Rev. 2024) (Semester - III)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) All questions are compulsory.
- 2) Figures to the right indicate full marks.

Q1) Attempt any Eight of the following :

[8 × 1 = 8]

- a) List two sutras of factorization.
- b) Divide 345 by 23 by vedic method.
- c) Define Anumana in Nyaya philosophy.
- d) What is care based reasoning.
- e) Who is the founder of Nyaya philosophy?
- f) How many sutras are approximately present in pannini's Ashthadhyaya?
- g) Name one ancient cryptographic technique need in kautilya's Arthashastra.
- h) Give one similarity between ancient and modern cryptographic practices.
- i) What is meru prastara?
- j) What is Vedic Mathematics?

Q2) Attempt any four of the following :

[4 × 2 = 8]

- a) Define the term Ashthadhyayi and its significance.
- b) Name the six orthodox Schools of Indian philosophy.
- c) Define argumentation and list the types of argumentation.
- d) Why can machine learning be not considered as truly intelligent in the vedantic sense?
- e) What does two - factor authentication mean in modern cryptography?

Q3) Attempt any two of the following :

[2 × 4 = 8]

- a) Explain with example how recursion works in pannini's grammar.
- b) Discuss the significance of Nyaya sutra and its contribution to Indian logic.
- c) Explain chandrashastras binary logic and combinational techniques.

P.T.O.

Q4) Attempt any two of the following :

[2 × 4 = 8]

- a) Explain the five step syllogism of Nyaya inference with real life examples.
- b) Explain structure of mind in Sankhya philosophy. How do its components relate to cognitive function? Compare it with how AI or machine learning processes information.
- c) Factorize the quadratic equation $5x^2 + 5x + 4$ by using both sutras. Also write benefits of using vedic math factorization.

Q5) Attempt any one of the following :

[1 × 3 = 3]

- a) Design a flowchart that demonstrates how a student can use chandasatra's binary logic to identify a sanskrit meter.
- b) What do you mean by Arthashastra? Explain cryptographic techniques in Arthashastra vs modern cryptography.



Total No. of Questions : 5]

SEAT No. :

PE-3431

[Total No. of Pages : 2

[6502]-102

S.Y. B.Sc. (Computer Science)
CS 221 - VSC-T : Software Engineering
(Rev. 2024) (Semester - III)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Draw neat and labelled diagrams wherever necessary.*
- 3) *Use of calculators is not allowed.*

Q1) Attempt any Eight of the following (out of Ten)

[8 × 1 = 8]

- a) Define Software.
- b) What is meant by Software Process?
- c) Define Requirements Engineering.
- d) What is the Waterfall Model?
- e) What is a Class Diagram in UML?
- f) Define Agility.
- g) What is a Sprint in Scrum?
- h) What is Unit Testing?
- i) What is RUP?
- j) What is white box testing?

Q2) Attempt any FOUR of the following (out of FIVE)

[4 × 2 = 8]

- a) Explain the nature of Software Engineering.
- b) List and explain any two fact-finding techniques.
- c) Write a short note on Incremental and Iterative Models.
- d) Explain the use of UML in software design.
- e) Write any four principles of Agile Development.

P.T.O.

Q3) Attempt any TWO of the following (out of THREE) **[2 × 4 = 8]**

- a) Describe any two Prescriptive Process Models (Waterfall and V-Model).
- b) Explain the Extreme Programming (XP) process with values and phases.
- c) Draw a **Class Diagram** showing classes, attributes, operations and relationship (inheritance, association). For following Case Study

A **Banking System** needs to manage accounts. Each account has an account number, customer name and balance. The bank offers Savings and Current accounts. Customers can deposit and withdraw money.

Q4) Attempt any TWO of the following (out of THREE) **[2 × 4 = 8]**

- a) Explain the Structural and Behavioral Models of UML with suitable examples.
- b) Explain the Adaptive Software Development (ASD) model with its three phases.
- c) Describe RAD Model with its advantages and disadvantages.

Q5) Attempt any one of the following (out of Two) **[1 × 3 = 3]**

- a) With help of diagram Explain DSDM in detail.
- b) Explain Unified Process in detail.



Total No. of Questions : 5]

SEAT No. :

PE-3432

[Total No. of Pages : 2

[6502]-103
S.Y. B.Sc.
COMPUTER SCIENCE
CS-201-MJ-T : Data Structure - I
(Revised 2024) (Semester - III)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*

Q1) Attempt any Eight of the following.

[8 × 1 = 8]

- a) What is Top of the stack.
- b) Define the term priority queue.
- c) Write node structure of Doubly linked list.
- d) Why there is a need of data structure.
- e) List operations performed on queue.
- f) Write time complexity of insertion sort.
- g) Compare singly linked list with circular singly linked list.
- h) What is the term stack overflow.
- i) List the advantages of Divide & Conquer strategy.
- j) List the measures used to calculate performance analysis of an algorithm.

Q2) Attempt any Four of the following.

[4 × 2 = 8]

- a) Define ADT? List advantages of ADT.
- b) Explain diagrammatic representation of double ended queue.
- c) List applications of stack.
- d) What is Generalized linked list.
- e) Define the term :
 - i) Internal sorting
 - ii) Comparison based sorting

P.T.O.

Q3) Attempt any Two of the following.

[2 × 4 = 8]

- a) Write a 'C' function to concatenate two singly linked list.
- b) Write a 'C' function to sort an array using selection sort.
- c) Write a 'C' program to check whether the string is palindrome or not using stack.

Q4) Attempt any Two of the following.

[2 × 4 = 8]

- a) Differentiate between Linear Search and Binary search.
- b) Explain the structure and working of circular doubly linked list with diagram.
- c) Convert the following infix expression to postfix expression by using stack. $a|b-c*d+e$

Q5) Attempt any One of the following.

[1 × 3 = 3]

- a) Explain various Asymptotic notations.
- b) Write a note on circular Queue.



Total No. of Questions : 5]

SEAT No. :

PE-3433

[Total No. of Pages : 3

[6502]-104

S.Y. B.Sc.

COMPUTER SCIENCE

CS-202-MJ-T : Database Management System - I

(Rev. 2024 Pattern) (Semester - III)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) All questions are compulsory.
- 2) Figures to the right indicate full marks.

Q1) Answer the following questions (Any 8 out of 10) : [8 × 1 = 8]

- a) What is a Candidate Key?
- b) What is a Functional Dependency?
- c) What is use of aggregate function MAX () and COUNT ().
- d) List DDL and DCL commands in SQL?
- e) Define 3NF
- f) Give Advantages of DBMS.
- g) Justify true or false “Every Primary key is Candidate key”.
- h) What is data inconsistency?
- i) What is a file system?
- j) Differentiate between strong and weak entity.

Q2) Answer the following questions (Any 4 out of 5) : [4 × 2 = 8]

- a) List the different types of users of a DBMS and explain any one of them.
- b) What are set operations in SQL? Explain any one set operations with example.
- c) Explain Order by Clause with example.
- d) What is DML? Explain in brief.
- e) State the symbols used in E-R D to represent i) Entity ii) Relationship iii) Attribute.

P.T.O.

Q3) Answer the following questions (Any 2 out of 3) :

[2 × 4 = 8]

- a) Consider the following relations:

Doctor (dno, d_name, specialization, charges)

Hospital (hno, h_name, city)

Doctor & Hospital are related with **Many to One** relationships.

Create a relational database in 3NF & solve the following queries in SQL.

- i) Find the names of Doctors who are working with “SopanDev” Hospital.
- ii) Find the Hospitals from “Saswad” City.
- iii) Find the doctors whose specialization is ‘Dental’ in ‘Poona Hospital’

- b) Consider the following relation:

R (A, B, C, D, E) and the set of FD’s defined on

R as : F = {A→B, CD→E, A→C, B→D, E→A}

Compute the closure of F i.e. **F⁺**

- c) Consider the following Entities and Relationships & solve the queries:

Proj (Pno, pname, ptype, duration)

Emp (eno, ename, qualification, salary)

Relation between **Proj** and **Emp** is **Many to Many**.

- i) Find the employees who are working on ‘ROBOTICS’ project.
- ii) Find Maximum number of Employees works on one project.
- iii) Update- increase the salary of every Employee by 15%.
- iv) Display project name and count of employees working on each project.

Q4) Answer the following questions (Any 2 out of 3) :

[2 × 4 = 8]

- a) Explain specialization & generalization with suitable diagrams.
- b) “Diamond” is an agency for flat booking and it has number of builders and agents who are jointly working. A customer can get a flat for residential or commercial purpose. If customer is approached through an agent the agency and builders are giving some commission to the agent. Agent shows various flats and sites within various location Draw ER Diagram for above case study.
- c) “Suyog Hotel” has many rooms. Rooms are classified as AC and Non-AC. Hotel provides the discount to customers who visit the hotel more than once. Hotel also has food section and laundry section. This facility gives to customer as per customer’s requirement. Every room of hotel has TV and telephone facility, which charge with the total cost of room. Draw an E-R diagram for above case study.

Q5) Answer the following questions (Any 1 out of 2) :

[1 × 3 = 3]

- a) Explain the concept of data abstraction in DBMS.
- b) What are Armstrong’s Axioms? State and explain them.



Total No. of Questions : 4]

SEAT No. :

PE-3434

[Total No. of Pages : 2

[6502]-105

S.Y. B.Sc. (Computer Science)

ELECTRONICS

ELC-241-MN-T : Embedded System With AVR

Microcontroller

(Rev. 2024) (Semester - III)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) All questions are compulsory.
- 2) Figures to the right indicate full marks.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Use of calculator is allowed.

Q1) Answer the following (Any five) :

[5 × 1 = 5]

- a) State any two software development tools used in embedded system.
- b) What is the ROM size of AT mega 32?
- c) How many timer register supported by AT mega 32?
- d) What is the role of PWM in DC motor interfacing?
- e) Write full form of SPI.
- f) Does LM-35 is Analog or Digital temperature sensor?

Q2) Answer the following (Any two) :

[2 × 5 = 10]

- a) List the different criteria for choosing a micro controller.
- b) Differentiate between serial and parallel communication with respective to data transfer, speed, no of wires, distance, cost.
- c) Explain the concept of Relay interfacing with an AVR and write an appropriate C-program to demonstrate the same.

Q3) Answer the following (Any two) :

[2 × 5 = 10]

- a) Write the name of various in build hardware units present in typical AVR mega series microcontroller unit.
- b) What are the features of ADC in AVR?
- c) Draw common Anode SSD interfacing with AVR microcontroller. Also write C-program to display numeric 'g' on common Anode SSD.

P.T.O.

Q4) Answer the following (Any four) :

[4 × 2½ = 10]

- a) Discuss any five application areas of Embedded system.
- b) Write short note on I/O ports in AVR microcontroller.
- c) Write embedded C-Program to toggle port-B of AVR microcontroller using delay function.
- d) Draw LCD interfacing diagram with ATmega 16/32 microcontroller.
- e) Draw bit format of TIFR ie timer counter interrupt flag register.
- f) Write short note on I2C.



Total No. of Questions : 3]

SEAT No. :

PE3435

[6502]-106

[Total No. of Pages : 2

S.Y.B.Sc. (Computer Science)

MATHEMATICS

MTC-241-MN-T : Mathematics for Computer Science - I

(Revised 2024 Pattern) (Semester - III)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) All questions are compulsory.
- 2) Figures to the right indicate full marks.
- 3) Non-programmable scientific calculator is allowed.

Q1) Attempt any five of the following.

[5×2=10]

- a) If 0.333 is the approximate value of $\frac{1}{3}$, then find relative and percentage errors.
- b) Show that $8E^{\frac{1}{2}} = \Delta$ using usual notations.
- c) Find the square root of 35 correct to two decimal places by using Newton Raphson method.
- d) Given that $f(1) = 26, f(2) = 18, f(3) = 4, f(4) = 1$. Construct the Backward difference table.
- e) Write the formula for Simpson's $\frac{3^{\text{th}}}{8}$ rule for numerical integration.
- f) Estimate missing term in following table

x	0	1	2	3
y	0	1	-	81

- g) Given that $\frac{dy}{dx} = x$ with $y(0) = 1$. Obtain $y(0.1)$ by Euler's method.
(Take $h = 0.1$)

P.T.O.

Q2) Attempt any three of the following.

[3×5=15]

- a) Derive Newtons divided difference formula for interpolation.
- b) Find the real root of the equation $x^3 - 5x + 3 = 0$ in $[0.6, 0.7]$ by Regula falsi method correct upto four decimal places.
- c) Given $y(1) = -3, y(3) = 9, y(4) = 30, y(6) = 132$. Obtain $y(2)$ by Lagranges Interpolation.
- d) Evaluate $\int_0^1 \frac{1}{1+x^2} dx$ by trapezoidal rule.

(Take $h = \frac{1}{6}$)
- e) Given $\frac{dy}{dx} = -xy^2$ with $y(2) = 1$. Obtain $y(2.1)$ by Eluvers modified method.

Q3) Attempt any two of the following.

[2×5=10]

- a) Derive Simpson's $\frac{1}{3}$ rd rule for numerical integration.
- b) Find the number of students from the following data who secured marks not more than 45

Mark range	30-40	40-50	50-60	60-70	70-80
No. of Students	35	48	70	40	22

- c) Given $\frac{dy}{dx} = y + x$ with $y(0) = 1$. Find $y(0.1)$ by Range Kutta method of fourth order.

