

Total No. of Questions : 5]

SEAT No. :

PA-994

[5902]-11

[Total No. of Pages : 2

F.Y.B.Sc. (Computer Science)
CS-101: PROBLEM SOLVING USING COMPUTER & 'C'
PROGRAMMING
(New CBCS 2019 Pattern) (Semester-I)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

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

Q1) Attempt any 8 of the following.

[8×1=8]

- a) What is description for syntax error?
- b) Describe the difference between = and == symbols in C programming?
- c) What is the process to create increment and decrement statement in C?
- d) What are reserved words with a programming language?
- e) Is 'C' language high level language? True/False-Justify.
- f) What are the valid places to have keyword "Break"?
- g) What is Algorithm?
- h) What is variable?
- i) What are input and output functions?
- j) What are applications of Array?

Q2) Attempt any four of the following.

[4×2=8]

- a) Explain any two datatypes.
- b) What is nested loop?
- c) List the different Backslash character constants.
- d) What is a compiler?
- e) Define Flowchart?

P.T.O.

Q3) Attempt any 2 of the following.

[2×4=8]

- Explain switch - case statement with suitable example.
- Write a 'C' program to accept 'n' numbers and print the even numbers.
- Write an algorithm and draw a flowchart for 'finding of area of triangle'.

Q4) Attempt any Two of the following.

[2×4=8]

- What is an identifier? Give the rules of identifier.
- Differentiate between if-else and while statement.
- Find the output of the following program and Justify.

```
main () {  
    int x = 100;  
    printf (" \n x = % d," 10 + x++);  
    printf (" \n x = % d," 10 + ++x);  
}
```

Q5) Attempt any 1 of the following.

[1×3=3]

- Explain Arrays and its types with example.
- Write 'C' program to accept a number and check whether it is an Armstrong number.

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F.Y. B.Sc. (Computer Science)
CS-112 : DATABASE MANAGEMENT SYSTEMS
(2019 CBCS Pattern) (Semester - I)

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) Justify true or false- "Primary key cannot be null"
- b) Define Database System.
- c) What is the primary key?
- d) What is the difference between entity & attributes?
- e) State the entity integrity constraint.
- f) Explain the use of the aggregate function.
- g) Define Generalization.
- h) Define the third normal form.
- i) List the commands in DDL?
- j) List any two disadvantages of DBMS.

Q2) Attempt any FOUR of the following.

[4×2=8]

- a) Explain various types of users in DMS.
- b) Explain the ternary relationship with an example.
- c) What is DML? Explain procedural DML.
- d) Write syntax for CREATE TABLE statement and UPDATE statement.
- e) Give the applications of the closure set of attributes.

Q3) Attempt any TWO of the following.

[2×4=8]

- a) Write a short note on data abstraction.
- b) State and explain different types of relationships that can exist in an entity set in an E-R model.
- c) What is a referential integrity constraint? Explain in brief.

R.T.O.

Q4) Attempt any TWO of the following.

[2×4=8]

a) Consider the following relation: R(A, B, C, D, E) and the set of FDs defined on R as: $F = \{A \rightarrow B, C \rightarrow E, A \rightarrow C, B \rightarrow D, E \rightarrow A\}$. Compute the closure of F i.e., F^+ .

b) Consider the following relations:

Wholesalers (wno, wname, address, city)

Product (Pno, Pname)

Wholesalers and product are related with many to many relationships. Create a relational database in 3NF and solve the following queries in SQL:

- List the wholesalers of product 'Mouse'.
- Count the number of wholesalers from 'Pune' city.
- Delete records of wholesalers where the product name is 'Scanner'.

c) Consider the following relations:

Supplier (S_id, sname, address)

Parts (P_id, Pname, Colour)

Suppliers and parts are related with many to many relationships with the descriptive attribute cost. Create a relational database in 3NF and solve the following queries in SQL:

- Find the names of suppliers who supply parts that are blue or pink in colour.
- Find the total cost of all parts supplied by 'Shree Agencies'.
- Find the names and addresses of all suppliers who are supplying the item 'Bath towel'.

Q5) Attempt any ONE of the following.

[1×3=3]

a) Consider a trucking company which is responsible for picking up shipments for warehouses of a retail chain and deliver the shipments to the individual store location. A truck may carry several shipments in a single trip and deliver it to multiple stores. Draw an E-R diagram for the truck shipment system.

b) In an order processing system where a person with characteristics name, address, phone, and person id can give the order for many items by specifying its quantity. Item has characteristics item number and description. Draw an E-R diagram for the order processing system.



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

ELECTRONICS

ELC-III : Semiconductor Devices and Basic Electronic Systems

(2019 Pattern) (Semester - I) (CBCS)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Question 1 is Compulsory.
- 2) Solve any three questions from Q.2 to Q.5.
- 3) Figures to the right indicate full marks.
- 4) Draw neat diagrams wherever necessary.
- 5) Question 2 to 5 carry equal marks.

Q1) Solve any five of the following.

[5×1=5]

- a) Draw circuit symbol of photodiode.
- b) What is full form of MOSEFT.
- c) For transistor $\alpha = 0.98$, find the value of β .
- d) List any two application of solar cell.
- e) State any two types of MOSFET.
- f) State two conditions of Barkhausen criteria.

Q2) A) Attempt any two of the following.

[2×3=6]

- a) Explain the working principle of LED in detailed.
- b) Compare half wave and full wave Rectifier.
- c) With neat diagram, Explain working of n-channel DEMOSFET.

B) Define α and β . Derive the relation of α in terms of β .

[1×4=4]

P.T.O.

Q3) A) Attempt any two of the following. [2×3=6]

- a) Compare CB, CE and CC Configuration of transistor. (any three points)
- b) Explain working Principle of Astable multivibrator.
- c) With the help of diagram, explain 2-bit flash ADC.

B) Draw the block diagram of Regulated power supply and explain each block in detail. [1×4=4]

Q4) A) Attempt any two of the following. [2×3=6]

a) Draw and explain I-V characteristics of forward bias PN-Junction diode.

b) Write a short note a SMPS.

c) Define the following parameter of DAC

- i) Accuracy
- ii) Resolution
- iii) Linearity

B) Explain the working of N-P-N transistor in detail. [1×4=4]

Q5) Attempt any four of the following. [4×2.5=10]

a) Explain the working principle of optocoupler.

b) Draw the diagram for drain characteristic of n-channel E-MOSFET

c) Define the terms w.r.t. power supply.

- i) Ripple Factor.
- ii) Peak Inverse voltage.
- iii) Load Regulation.

d) In Wien bridge Oscillator $R = 2k\Omega$ $C = 0.52 \mu f$ calculate the frequency of oscillator.

e) Calculate the analog output for 4 bit R - 2R ladder DAC for input Assume logic 0 = 0v Logic 1 = 1v

- i) 1001
- ii) 1101

f) State the applications of ADC.



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

ELECTRONICS SCIENCE

ELC-112 : Principles of Digital Electronics
(2019 Pattern) (Semester - I) (CBCS) (Paper-II)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Question 1 is Compulsory.
- 2) Solve any three questions from Q.2 to Q.5.
- 3) Figures to the right indicate full marks.
- 4) Draw neat diagrams wherever necessary.

Q1) Solve any five of the following

[5×1=5]

- a) Define propagation delay.
- b) Draw symbol and Truth Table of AND logic
- c) Convert $(23)_{10} = (?)_{BCD}$
- d) What is the base of Decimal number system.
- e) How many select lines are required to design 1 : 8 Demultiplexer.
- f) What is Non-weighted code?

Q2) a) Any Two of the following.

[2×3=6]

- i) State and prove De-morgan's Theorem
- ii) Convert $(45)_{10} - (25)_{10} = (?)_2$ using 2's complement
- iii) Convert given SOP equation to standard SOP

$$\bar{A}\bar{B} + B\bar{C} + \bar{A}C$$

b) Draw and explain 4-bit universal Adder Subtractor.

[1×4=4]

P.T.O.

Q3) a) Attempt any two of the following. [2×3=6]

- i) Draw and explain one bit digital comparator.
- ii) Simplify following expression using laws of boolean algebra.

$$Y = \bar{A}\bar{B}\bar{C} + \bar{A}B\bar{C} + A\bar{B}\bar{C} + ABC$$

- iii) Subtract $(10110)_2$ from $(63)_{10}$ and write down result in binary.
- b) Draw and explain the logic diagram of 1 : 4 Demultiplexer. [1×4=4]

Q4) a) Attempt any two of the following. [2×3=6]

- i) Simplify the following logical expression using k-map.

$$Y = \bar{A}\bar{B}C + \bar{A}B\bar{C} + A\bar{B}\bar{C} + \bar{A}B\bar{C} + \bar{A}BC$$

- ii) Explain full Adder with neat logic diagram and truth table.
- iii) Convert following.

1) $(101101)_2 = (?)_{16}$

2) $(111)_{10} = (?)_2$

3) $(123)_{10} = (?)_{16}$

- b) Design Binary-to-Gray Converter using Karnaugh map technique.

[1×4=4]

Q5) Attempt any four of the following [4×2.5=10]

- a) Draw Truth table of BCD to 7-Segment Decoder and it's block diagram.
- b) Design AND, OR & NOT logic using NOR gate only.
- c) Write short note on ASCII.
- d) Enlist any FIVE parameters of logic family
- e) Explain Ex-OR gate as controlled inverter.
- f) Write short note on weighted code.

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SEAT No. :

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

MATHEMATICS

MTC-111 : Matrix Algebra

(2019 Pattern) (Semester - I) (Paper-I)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

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

Q1) Attempt any Five of the following.

[10]

a) Let $A = \begin{bmatrix} 4 & -1 \\ 5 & -2 \end{bmatrix}$. Compute $3I_2 - A$.

b) Is the matrix $A = \begin{bmatrix} 6 & -9 \\ -4 & 6 \end{bmatrix}$ invertible? Justify.

c) Determine whether the given system is consistent.

$$x_1 + 5x_2 = 7$$

$$-2x_1 - 7x_2 = -5$$

d) What is the condition on matrix A, So that the homogeneous system of linear equations $Ax = 0$ has non-trivial solution?

e) Let $T : \mathbb{R}^3 \rightarrow \mathbb{R}^2$ be a linear transformation. Find the standard matrix of T, if $T(\bar{e}_1) = (1, 3)$, $T(\bar{e}_2) = (4, -7)$ and $T(\bar{e}_3) = (5, 4)$, where $\bar{e}_1 = (1, 0, 0)$, $\bar{e}_2 = (0, 1, 0)$ and $\bar{e}_3 = (0, 0, 1)$.

f) What is the rank of a 4×5 matrix, whose null space is 3 dimensional?

g) Does the vector $[X] = \begin{bmatrix} 2 \\ 1 \end{bmatrix}$ belong to Null A, where $A = \begin{bmatrix} 1 & -2 \\ -2 & 4 \end{bmatrix}$?

P.T.O.

Q2) Attempt any three of the following.

[15]

a) Find the volume of parallelepiped with one vertex at origin and adjacent vertices are $(1, 4, 0)$, $(-2, -5, 2)$ and $(-1, 2, -1)$.

b) Solve the system of linear equations.

$$x_1 - 3x_2 + 4x_3 = -4$$

$$3x_1 - 7x_2 + 7x_3 = -8$$

$$-4x_1 + 6x_2 - x_3 = 7$$

c) Determine whether $\vec{u} = \begin{bmatrix} 2 \\ -1 \\ 6 \end{bmatrix}$ is a linear combination of $\vec{u}_1 = \begin{bmatrix} 1 \\ -2 \\ 0 \end{bmatrix}$, $\vec{u}_2 = \begin{bmatrix} 0 \\ 1 \\ 2 \end{bmatrix}$

and $\vec{u}_3 = \begin{bmatrix} 5 \\ -6 \\ 9 \end{bmatrix}$.

d) Find a basis for null space of A.

Where $A = \begin{bmatrix} -3 & 6 & -1 & 1 & -7 \\ 1 & -2 & 2 & 3 & -1 \\ 2 & -4 & 5 & 8 & -4 \end{bmatrix}$

e) Determine whether the vectors $\vec{v}_1 = \begin{bmatrix} 0 \\ 0 \\ 2 \end{bmatrix}$, $\vec{v}_2 = \begin{bmatrix} 0 \\ 5 \\ -8 \end{bmatrix}$ and $\vec{v}_3 = \begin{bmatrix} -3 \\ 4 \\ 1 \end{bmatrix}$ are linearly independent in \mathbb{R}^3 .

Q3) Attempt any one of the following.

[10]

a) Convert the matrix $A = \begin{bmatrix} 3 & -7 & -2 \\ -3 & 5 & 1 \\ 6 & -4 & 0 \end{bmatrix}$ into LU factorization and use it to

solve $Ax = b$, where $b = \begin{bmatrix} -7 \\ 5 \\ 2 \end{bmatrix}$.

b) Show that $T : \mathbb{R}^2 \rightarrow \mathbb{R}^2$ defined by $T(x, y) = (x + y, x - y)$ is a linear transformation.

c) Prove that the set $S = \{\vec{u}_1, \vec{u}_2\}$ is linearly dependent if and only if one vector is a scalar multiple of the other.



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F.Y. B.Sc. (Computer Science)
MATHEMATICS
MTC-112 : Discrete Mathematics
(2019 Pattern) (Semester - I) (Paper-II)

Time : 2 Hours]

[Max. Marks : 35

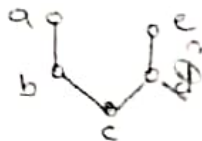
Instructions to the candidates:

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

Q1) Attempt any five of the following.

[10]

- a) In how many ways can the letters in the word 'MIRROR' be arranged?
- b) Find the terms a_3 and a_5 of the sequence (a_n) if the recurrence relation for (a_n) is $a_n = a_{n-1} + a_{n-2}$, $n \geq 3$ with initial condition $a_1 = 1, a_2 = 1$.
- c) Draw the digraph for the relation $R = \{(1, 2), (2, 2), (2, 1), (3, 4), (4, 3)\}$ on the set $X = \{1, 2, 3, 4\}$.
- d) State the converse and contrapositive of the following implication.
'If it snows today, I will ski tomorrow'.
- e) Is the following Hasse diagram a lattice? Justify.



- f) State pigeonhole principle.
- g) Translate the following into symbolic form.
 - i) There exists a natural number x such that " $x^2 + 1 = 0$ ".
 - ii) All rationals are real numbers.

P.T.O.

Q2) Attempt any three of the following.

[15]

- Show that in a Boolean algebra every element x has unique complement \bar{x} such that.
 $x \vee \bar{x} = 1$ and $x \wedge \bar{x} = 0$.
- How many 4 digit numbers whose digits are taken from the set $S = \{1, 2, 3, 4, 5\}$ (without repetition) are there? How many of them are divisible by 5?
- Find disjunctive normal form for the function $F(x, y, z) = (x \vee y) \wedge \bar{z}$
- Solve the recurrence relation given below. $a_n - a_{n-1} - 2a_{n-2} = 0$.
- Verify whether the following statements are tautology, contradiction or neither. $(p \wedge q) \wedge \sim p$.

Q3) Attempt any one of the following.

[10]

- How many integers between 1 and 1000 are divisible by
 - 2 or 3 or 5
 - 2 and 3 but not 5.
- Find transitive closure of relation $R = \{(a, b), (b, a), (b, c), (c, d)\}$ Also draw digraph of transitive closure of R .

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SEAT No. :

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[5902]-J8

F.Y. B.Sc. (Computer Science)
STATISTICS
CSST-112 : Mathematical Statistics
(2019 Pattern) (Semester-I) (Paper-II)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) All questions are compulsory.
- 2) Figures to the right indicate full marks.
- 3) Use of calculator and statistical tables is allowed.
- 4) Symbols and abbreviations have their usual meaning.

Q1) Choose the most appropriate alternative for each of the following. [1Each]

- a) If $P(A) = 0.4$, $P(B) = 0.3$ $P(A \cap B) = 0.2$, then $P(A \cup B) =$
 - i) 0.9
 - ii) 0.5
 - iii) 0.12
 - iv) 0.1
- b) If two events A and B are independent events defined on sample space Ω such that $P(A') = 0.3$ and $P(B') = 0.6$. Then $P(A' \cap B') =$
 - i) 0.28
 - ii) 0.9
 - iii) 0.18
 - iv) 0.1
- c) The number of ways in which the letters of the word 'STRING' can be arranged are.
 - i) 6
 - ii) 720
 - iii) 1
 - iv) 270
- d) The parameter of binomial distribution is/are
 - i) n
 - ii) θ
 - iii) n,p
 - iv) λ

Q2) Attempt any FIVE of the following.

[5×2=10]

- a) How many two-digit numbers can be formed from the digits 1,2,3,4,5?
- b) Define the terms 'Sample space' and 'Event'.
- c) State the formula of conditional probability of an event
 - i) A given B
 - ii) B given A

P.T.O.

- d) Explain the term sensitivity of the test.
- e) State any two properties of distribution function of a discrete random variable.
- f) Define probability mass function.
- g) State axioms of probability.
- h) What is Bernoulli trial? Explain with an illustration.

Q3) Attempt any Two of the following: [2×4=8]

- a) A student has to answer 8 out of 10 questions in an examination.
 - i) How many choices has he?
 - ii) How many choices has he if he must answer the first 3 questions?
- b) State the classical definition of probability. State its limitations.
- c) Define the following terms with an illustration.
 - i) Discrete random variable
 - ii) Continuous random variable

Q4) Attempt any Two of the following. [2×4=8]

- a) Define uniform distribution of a random variable taking values 1,2,3,...,n. State its mean and variance.
- b) Define the terms
 - i) Independent events
 - ii) Partition of sample space.
 Also state the Bayes' theorem.
- c) Define geometric distribution. State its mean and variance.

Q5) Attempt any one of the following: [1×5=5]

- a) A discrete random variable X has following probability distribution:

X	0	1	2	3	4	5
P[X = x]	p	3p	5p	7p	11p	13p

Find

- i) the value of p
 - ii) $E(X)$
 - iii) $P(X \leq 2)$
- b) State probability mass function of Poisson distribution. State its additive property. Also state the conditions under which binomial distribution can be approximated to Poisson distribution.