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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 Arrary?

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?

Q3) Attempt any 2 of the following. **[2×4=8]**

a) Explain switch - case statement with suitable example.

b) Write a 'C' program to accept 'n' numbers and print the even numbers.

c) Write an algorithm and draw a flowchart for 'finding of area of traingle'.

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

a) What is an identifier? Give the rules of identifier.

b) Differentiate between if-else and while statement.

c) Find the output of the following program and Justify.
```
main () {
        int x = 100;
        print f (" \n x = % d," 10 + x++);
        print f ("\n x = % d," 10 + ++x);
        }
```

Q5) Attempt any 1 of the following. **[1×3=3]**

a) Explain Arrays and its types with example.

b) Write 'C' program to accept a number and check whether it is an Armstrong number.

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[**Total No. of Pages : 2**

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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 TALE 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.

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- >B, CD->E, A->C, B->D, E->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:

        i)   List the wholesalers of product 'Mouse'.

        ii)   Count the number of wholesalers from 'Pune' city.

        iii)   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:

        i)   Find the names of suppliers who supply parts that are blue or pink in colour.

        ii)   Find the total cost of all parts supplied by 'Shree Agencies'.

        iii)   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)
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 $T : R^3 \rightarrow R^2$ 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 parallelopiped 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 $\bar{u} = \begin{bmatrix} 2 \\ -1 \\ 6 \end{bmatrix}$ is a linear combination of $\bar{u}_1 = \begin{bmatrix} 1 \\ -2 \\ 0 \end{bmatrix}$, $\bar{u}_2 = \begin{bmatrix} 0 \\ 1 \\ 2 \end{bmatrix}$

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

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 $\bar{v}_1 = \begin{bmatrix} 0 \\ 0 \\ 2 \end{bmatrix}$, $\bar{v}_2 = \begin{bmatrix} 0 \\ 5 \\ -8 \end{bmatrix}$ and $\bar{v}_3 = \begin{bmatrix} -3 \\ 4 \\ 1 \end{bmatrix}$ are

linearly independent in R³.

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 $T : R^2 \to R^2$ defined by $T(x, y) = (x + y, x - y)$ is a linear transformation.

c) Prove that the set $S = \{\bar{u}_1, \bar{u}_2\}$ 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.
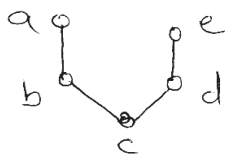
     f)   State pigeonhole principle.

     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.

Q2) Attempt any three of the following. **[15]**

a) Show that in a Boolean algebra every element x has unique complement $\bar{x}$ such that.

$x \vee \bar{x} = 1$ and $x \wedge \bar{x} = 0$.

b) 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?

c) Find disjunctive normal form for the function $F(x, y, z) = (x \vee y) \wedge \bar{z}$

d) Solve the recurrance relation given below. $a_n - a_{n-1} - 2a_{n-2} = 0$.

e) Verify whether the following statements are tautology, contradiction or neither. $(p \wedge q) \wedge \sim p$.

Q3) Attempt any one of the following. **[10]**

a) How many integers between 1 and 1000 are divisible by

i) 2 or 3 or 5

ii) 2 and 3 but not 5.

b) 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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F.Y. B.Sc. (Computer Science)
ELECTRONICS
ELC-111 : 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 MOSFET.

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 interms of β.   **[1×4=4]**

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 = 2kΩ C = 0.52 uf calculate the frequency of oscillator.

  e)   Calculate the analog output for 4 bit R - 2R laddar 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 propogation 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

$\overline{A}\,\overline{B}+B\overline{C}+\overline{A}C$

b) Draw and explain 4-bit universal Adder/Substractor. [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.

$$Y = \overline{A}\,\overline{B}\overline{C} + \overline{A}\,B\overline{C} + A\overline{B}\overline{C} + ABC$$

    iii) Substract $(10110)_2$ 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.

$$Y = \overline{A}\,\overline{B}C + \overline{A}\,\overline{B}\overline{C} + AB\overline{C} + \overline{A}B\overline{C} + \overline{A}BC$$

    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 ASCIT.

  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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F.Y. B.Sc. (Computer Science)
STATISTICS
CSST-111 : Descriptive Statistics-I
(2019 Pattern) (Semester - 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.**[1 mark each]**

 a) In frequency distribution ogive curves represent graphically the

 i) cumulative frequency   ii) relative frequency

 iii) frequency   iv) raw data

 b) The middle most observation of ordered data is the

 i) arithmetic mean   ii) mode

 iii) first quartile   iv) median

 c) The standard deviation of the data set (7, 7, 7, 7, 7,) is

 i) 7   ii) $\sqrt{7}$

 iii) 0   iv) 1

 d) The coefficient of association for two attributes lies between

 i) −1 and +1   ii) 0 and 1

 iii) −1 and 0   iv) 0 and 2

Q2) Attempt any FIVE of the following. **[2 marks each]**

  a) Explain with illustration each of the following:
   i) variable
   ii) open end class

  b) Define exclusive type of class interval. Convert the following class intervals to equivalent exclusive class intervals

   50-59

   60-69

   70-79

  c) A group of 10 observations has arithmetic mean 25. One more observation of value 30 is added to the group. Find the arithmetic mean of the new group.

  d) The mean of 10 observations is 50 and coefficient of variation is 20%. Find the value of the variance.

  e) If the distribution is positively skewed state the relationship between
   i) Mean, median, mode
   ii) Quartiles

  f) Define central moments. Also write the expression for fourth central moment.

  g) Write the conditions of consistency for a single attribute A.

  h) Define
   i) Ultimate class frequency
   ii) Positive classes

Q3) Attempt any TWO of the following. **[4 marks each]**

  a) Define the arithmetic mean for a grouped frequency distribution. Also state its merits.

  b) Explain the relative measures of dispersion. How they are better than absolute measures of dispersion?

  c) The data given below is related to marks obtained by two groups of students.

	Group I	Group II
Size	100	50
Mean	60	40
Variance	9	4

   Which group is more consistent in performance? Justify.

Q4) Attempt any TWO of the following. **[4 marks each]**

a) Write a short note on stem and leaf chart.

b) If A and B are independent attributes then show that the attributes:

   i) α and B are also independent.

   ii) A and β are also independent.

c) For a moderately skewed distribution, the mean is 29.6 and the standard deviation is 6.5 and Pearson's coefficient of skewness is 0.32. Find the made and the median of the distribution.

Q5) Attempt any ONE of the following. **[5 marks each]**

a) Explain the types of skewness with the help of sketches. State the formula of any one of the measures of skewness.

b) Let attributes A and B represent 'going to morning walk' and 'fit'.

Compute Yule's coefficient of association for the given information and comment on it. N = 200; (A) = 120; (B) = 100; (AB) = 80

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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 distrubution 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

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) $P(X <= 2)$

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.

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F.Y.B.Sc. (Computer Science)
CS-121: ADVANCED 'C' PROGRAMMING
(New CBCS 2019 Pattern) (Semester-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)   *Assume suitable data if necessary.*

Q1) Attempt any 8 of the following.   **[8×1=8]**

 a)   What is null pointer?

 b)   What is array of pointers?

 c)   Write 2 properties of command line argument.

 d)   What is the purpose of 'include' in a c-program?

 e)   Which Functions used to write data into File?

 f)   What is use of rewind ().

 g)   Write advantages of union.

 h)   Which Functions are used to read a string?

 i)   What is use of typedef?

 j)   What is string literal?

Q2) Attempt any four of the following. (out of 5).   **[4×2=8]**

 a)   Write short note on MACRO substitution directive (define).

 b)   Write difference between call by value and call by reference.

 c)   What is string? How to declare string and initialize string.

 d)   Write short note on accessing structure members.

 e)   Explain various File acces mode.

Q3) Attempt any 2 of the following (out of 3). **[2×4=8]**

   a) Program to create structure Book Detail and display the book details in Proper Format by Passing the structure as Function argument.

   b) Program to compute the sum of all elements in an array using pointers.

   c) Program to concatenate two strings in single string using arrays.

Q4) Attempt any 2 of the following. (out of 3). **[2×4=8]**

   a) Program to copy File into another using command line arguments.

   b) What is structure? Write the difference between structure & union.

   c) Write short note on dynamic memory management.

Q5) Attempt any 1 of the following. (out of 2). **[1×3=3]**

   a) Program to calculate area and circumference of circle using macro.

   b) Explain any 3 string Searching functions.

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F.Y.B.Sc. (Computer Science)
CS-122: RELATIONAL DATABASE MANAGEMENT SYSTEM
(2019 CBCS Pattern) (Semester-II) (Paper-II)

Time : 2 Hours]   *[Max. Marks : 35*
Instructions to the candidates:
   1)   *Total number of questions 5.*
   2)   *Q.1 - Q.4 carries equal marks and Q.5 carries 3 marks.*
   3)   *All questions care compulsory.*

Q1) Attempt any eight of the following.   **[8×1=8]**

   a)   Key-value and graph databases are examples of NoSQL. State TRUE/FALSE.

   b)   Define cascading rollback.

   c)   Write syntax of GRANT command.

   d)   What is shared lock?

   e)   What do you mean by bound cursor?

   f)   What are audit trails?

   g)   When does the dirty read occur?

   h)   What is content-based query?

   i)   Serializability can easily be ensured if access to database is done mutually exclusive manner. State TRUE/FALSE.

   j)   Which term is used for a collection of in-memory buffers?

Q2) Attempt any four of the following.   **[4×2=8]**

   a)   Write difference between wound-wait and wait-die.

   b)   Explain REVOKE command with one example.

   c)   State different levels of security.

   d)   List the error levels used in raise statement.

   e)   State methods for implementing timestamp.

Q3) Attempt any two of the following. [2×4=8]

    a)   Write a cursor to list details of students who have taken RDBMS as a subject. Consider the following schema for writing this:

        Student (sno, sname)

        Teacher (tno, tname, tqualification)

        Both these are related with many-many relationship.

    b)   Which are different types of log entries are there in system log, explain with examples?

    c)   State and explain commands that are used to generate and destroy a view.

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

    a)   Following are the log entries at the time of system crash:

        <T1, start>

        <T1, X, 40>

        <T1, commit>

        <checkpoint>

        <T2, start>

        <T2, U, 80>

        <T3, start>

        <T3, Z, 40>

        <T2, commit>

        system crash

        if immediate update technique is used, what will be the recovery procedure?

b) The following is a list of events in an interleaved execution of set of transaction T1, T2, T3, T4 with two phase locking protocol:

Time	Transaction	Code
t_1	T1	LOCK (A,X)
t_2	T2	LOCK (B,S)
t_3	T3	LOCK (A,X)
t_4	T4	LOCK (C,S)
t_5	T1	LOCK (B,X)
t_6	T2	LOCK (C,X)
t_7	T3	LOCK (D,S)
t_8	T4	LOCK (D,S)

Find, is there any deadlock? If yes, which transactions are involved in a deadlock?

c) Consider the following schema:

Student (roll, name, address, class)

Subject (code, subjectname, teachername)

Stud _Sub(roll, code, marks)

Define a trigger before insert for every row as a student-subject table, whatever marks entered is <0 or >100, raise an application error and display corresponding message.

Q5) Attempt any ONE of the following. [1×3=3]

a) What is transaction? Explain ACID properties in detail.

b) Write a short note on multimedia database.

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[5902]-23

F.Y. B.Sc. (Computer Science)
MATHEMATICS
MTC - 121 : Linear Algebra
(2019 Pattern) (Semester - II) (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) Suppose $V = M_{2 \times 2}$, a set of matrices of order 2×2 with real entries. we

define, $w = \left\{ \begin{bmatrix} a & o \\ c & d \end{bmatrix} \middle/ a,c,d \in \mathbb{R} \right\}$ show that, w is a subspace of v.

b) Let $T : \mathbb{R}^2 \to \mathbb{R}^3$ be a non-empty function defined by,

$T(x_1, x_2) = (x_1 + x_2 + 1, -4x_1 + x_2, 2x_2)$ Justify, (whether) T is a linear transformation.

c) If $\lambda = -2$, is an eigenvalue of a matrix $A = \begin{bmatrix} 7 & 3 \\ 3 & -1 \end{bmatrix}$ then find the

corrosponding eigenvector.

d) Show that the vector $u = \begin{bmatrix} 12 \\ 3 \\ 5 \end{bmatrix}$ & $v = \begin{bmatrix} 2 \\ -3 \\ -3 \end{bmatrix}$ are orthogonal to each other.

e) Compute the quadratic form of $A = \begin{bmatrix} 3 & -2 \\ -2 & 7 \end{bmatrix}$.

f) Define
   i) Affine combination of vectors.
   ii) Convex combination of vectors.

g) Define 'basis' for vector space.

P.T.O.

Q2) Attempt any three of the following: **[15]**

a)   Determine, whether the set of vectors $S = \{(1,0,-2),\ (3,2,-4),\ (-3,-5,1)\}$ forms a basis of $\mathbb{R}^3$.

b)   Let $A = \begin{bmatrix} 1 & -3 & 3 \\ 3 & -5 & 3 \\ 6 & -6 & 4 \end{bmatrix}$

Find

i)   Eigenvalues of A.

ii)   Eigenvector corrosponding ot the largest eigenvalue of A.

c)   Let $U = [u_1\ u_2]$, where $u_1 = \begin{bmatrix} 2/3 \\ 1/3 \\ 2/3 \end{bmatrix} \cdot u_2 = \begin{bmatrix} -2/3 \\ 2/3 \\ 1/3 \end{bmatrix}$ & $y = \begin{bmatrix} 4 \\ 8 \\ 1 \end{bmatrix}$

compute

i) Proj_W^y - where, $W = \text{span } \{u_1, u_2\}$

ii) $\{UU^T\}_y$

d)   Classify the quadratic form $2x^2 - 4x_1x_2 - x_2^2$ by using the principle axis theorem.

e)   Let $B = \{1 + t^2,\ t + t^2,\ 1 + 2t + t^2\}$ be a basis of P_2.

Find the coordinate vector of $p(t) = 1 + 4t + 7t^2$, relative to B.

Q3) Attempt any one of the following. **[10]**

a)   Find the bases for the row space, the column space & Null space of A.

Where, $A = \begin{bmatrix} 1 & -4 & 9 & -7 \\ -1 & 2 & -4 & 1 \\ 5 & 6 & 10 & 7 \end{bmatrix}$.

b) i) Prove that, an indexed set $s = \{\vec{u}_1, \ldots \vec{u}_k\}$ of two or more vectors with $\vec{u}_i, i > 1$ is a linear combination of the preceding vectors $\{\vec{u}_1, \ldots, \vec{u}_{i-1}\}$

ii) If $u = \begin{bmatrix} \frac{7}{4} \\ \frac{1}{2} \\ 1 \end{bmatrix}$ & $v = \begin{bmatrix} -4 \\ -1 \\ 8 \end{bmatrix}$

then find : 1) A unit vector in the direction of vector u.'

2) $\|u + v\|$.

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[5902]-24
F.Y. B.Sc. (Computer Science)
MATHEMATICS
MTC - 122 : Graph Theory
(2019 Pattern) (Semester - II) (Paper - II)

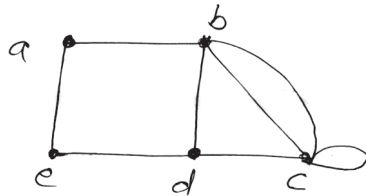*Time : 2 Hours]*

[Max. Marks : 35

Instructions to the candidates:
1) *All questions are compulsory.*
2) *Figures to the right indicate full marks.*
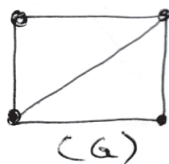3) *Neat diagrams must be drawn wherever necessary.*

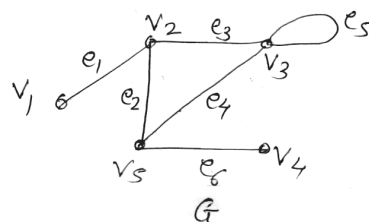**Q1)** Attempt any five of the following.   **[10]**

a) Define complete graph K_n on *n* vertices. Also draw K_4.
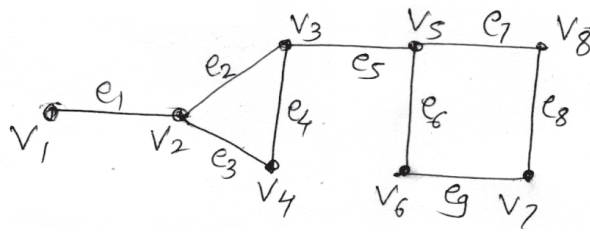
b) Verify handshaking lemma for the following graph.

c) Determine whether an Euler circuit exists in the following graph G. Justify your answer.

d) Evaluate the following post fix expression. $+-*235/\uparrow 234$.

e) Define regular graph. Also draw one 3 - regular graph.

f) Draw the graph $G-\{v_2\}$ for the following graph G.

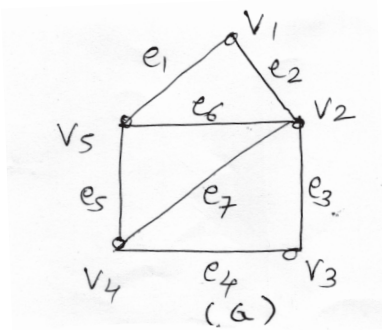g) Find all bridges (cutedges) in the following graph.

Q2) Attempt any three of the following: [15]

a) Write the adjacency and incidence matrix for the following graph G.
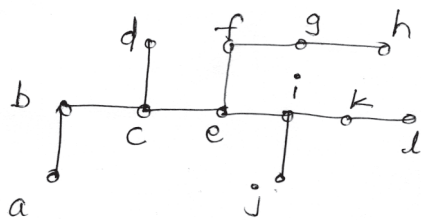

(.G)

b) Define Hamiltonian graph.

Give Example of

i) Hamiltonian graph

ii) Hamiltonian graph which is not Evlerian.

c) Find center, radius and diameter for the following graph.

d) Determine whether the following graphs are isomorphic.
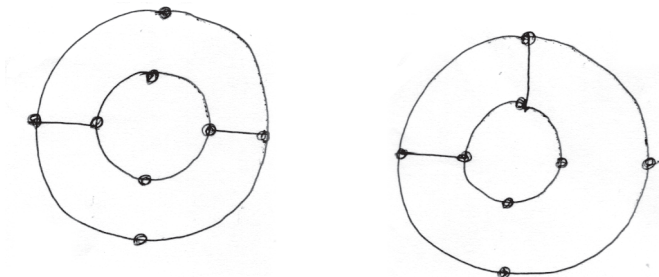
e) Consider the following graph G.
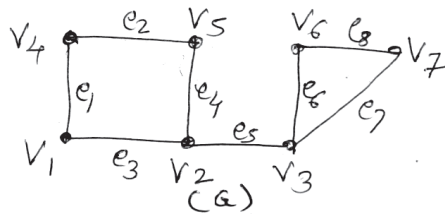
i) Write a path from vertex V_1 to verlex V_7.

ii) What is vertex connectivity of G?

iii) What is edge connectivity of G?

Q3) Attempt any one of the following. **[10]**

a) i) In which order does a preorder traversal visit the vertices in the following ordered rooted tree?
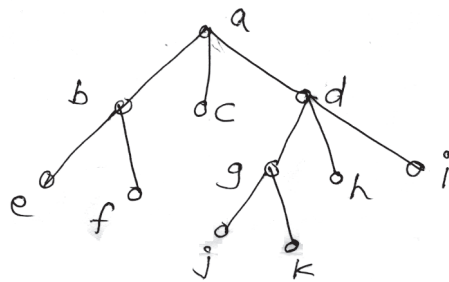
ii) Draw binary trees on 11 vertices with minimum height and maximum height.

b) Use Kruskal's algorithm to find a minimum spanning tree in the following weighted graph.

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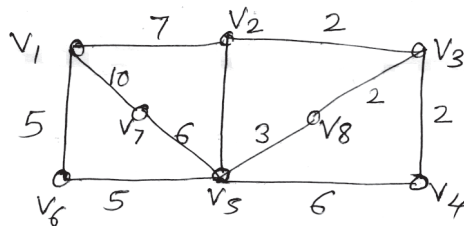
[5902]-25
F.Y. B.Sc. (Computer Science)
ELECTRONICS
ELC - 121 : Instrumentation System
(New 2019 Pattern) (Semester - II) (CBCS) (Paper - I)

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)   *Questions 2 to 5 carry equal marks.*

Q1) Solve any five of the following.   **[5×1=5]**

  a)   What is full form of CCD?

  b)   What is sensor? Give any one example.

  c)   Define dark Resistance w.r.t to LDR.

 d)   What is input offset voltage?

  e)   What is thick flim sensor?

  f)   Find the output of the following circuit.
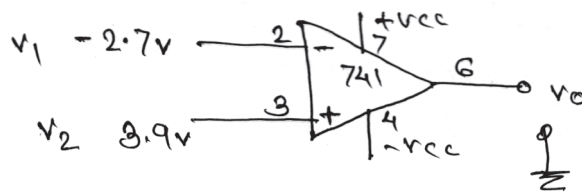
Q2) a)   Attempt any two of the following: **[2×3=6]**

  i)   Write short note on Tilt Sensor.

  ii)   With the help of neat diagram, explain working principle of stepper
        motor.

  iii) What is Flim sensor? Which are two types of flim sensor? Give any
        two application of flim sensors.

  b)   Draw the circuit diagram of op.Amp as subtractor and drive the expression
       for its output voltage.   **[1×4=4]**

P.T.O.

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

    i)   State working principle of ultrasonic sensor. State any two application of ultrasonic sensor.

    ii)   Draw smart instrumentation system. Give two advantages.

    iii) What is thermistors? Give the equation of resistance change with respective to temperature for thermistor.

  b) Draw the circuit diagram of op-Amp as adder and drive the expression for its output voltage. **[1×4=4]**

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

    i)   Draw the block diagram of an Op-Amp and explain.

    ii)   Write a short note on PIR sensor.

    iii) In Non inverting amplifier vin = 6.5v where RF = 24k, R = 4kΩ find the value of

        1)   Output voltage

        2)   Voltage gain

  b) Explain LDR on the basis of the following points:- Working principle, structure and symbol, material used, its application. **[1×4=4]**

Q5) Attempt any Four of the following: **[4×2.5=10]**

  a) What is transduer? Define following with respective to sensor.

    i)   Accuracy

    ii)   Sensitivity

  b) Explain working principle of DC motor.

  c) Write a short note on LM-35.

  d) What is nanosensors? How nanosensors are fabricated? Give any limitation of nanosensors.

  e) Explain the concept of virtual ground in Op-Amp.

f) Identify the following Op-Amp configurations and find their output voltages.

i)

5.4V
Vin
R 2k
RF 16K
2 —
+vcc 7
3 +
6
−vcc 4
Vo ?

ii)

2 —
3 +
7 +vcc
6
4 −vcc
Vin
− 3.4V
Vo

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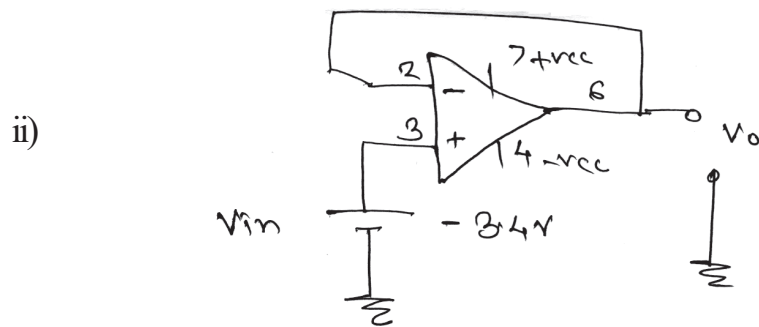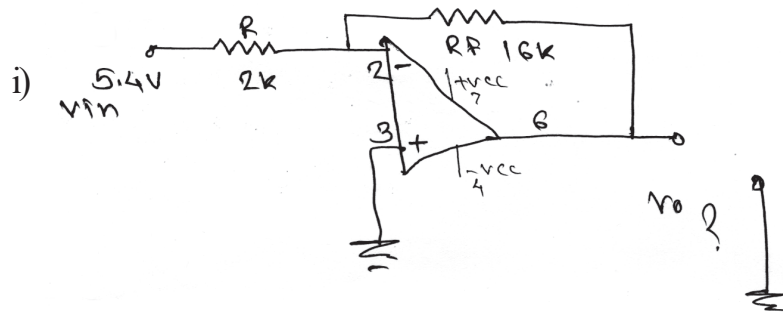
[5902]-26
F.Y. B.Sc. (Computer Science)
ELECTRONIC SCIENCE
ELC - 122 : Basics of Computer Organisation
(2019 Pattern) (CBCS) (Semester - II) (Paper - II)

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)   Draw symbol of 'D' FF (Flip-Flop)?

   b)   State any two applications of shift registers?

   c)   In computer organisation. What is the significance of control bus?

   d)   Why program counter register is used inside of microprocessor?

   e)   How many address lines will be used to construct 4 MB of memory locations?

   f)   What is the full form of 'ALU' and what is it's role in microprocessor.

Q2) a)   Solve any two of following.   **[2×3=6]**

   i)   Explain with neat diagram 3 bit PIPO shift register.

   ii) Discuss the concept of J.K.FF (Flip-Flop) with Logic circuit diagram and truth table.

   iii) Design 1K×16 memory capacity using 1K×4 memory chip integrated circuits.

   b)   Draw and explain CPU (Central Processing Unit) block diagram in detail.
                                                                    [1×4=4]

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

  i) What is Ring counter, draw and explain it.

  ii) Explain concept of stack organisation.

  iii) The number of references made by CPU to memory (Cache) are 100 and 90 times data was present in Cache memory. How much will be the cache hit ratio and cache miss ratio.

  b) Draw and explain 3 bit down counter. [1×4=4]

Q4) a) Answer any two of the following: [2×3=6]

  i) Explain concept of 'T' Flip Flop in detail.

  ii) What is the importance of I/O interface, discuss details.

  iii) Write differences between synchronous and asynchronous counter. (any three differences)

  b) Discuss in detail four (4) level memory hierarchy. [1×4=4]

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

  a) Explain how RS Flip flop can be converted into 'D' Flip Flop.

  b) Draw logic circuit diagram of 3 bits combinational Up - Down counter.

  c) Explain importance and working of cache memory in based computer organisation.

  d) Draw logic diagram of register based CPU organisation.

  e) Explain concept of virtual memory.

  f) Calculate average access time if hit ratio is 95%, cache memory access time is 400 nsec and main memory access time is 600 nsec.

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[5902]-27
F.Y. B.Sc. (Computer Science)
STATISTICS
CSST - 121 : Methods of Applied Statistics
(2019 Pattern) (Semester - II) (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 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: **[1 each]**
   i)   Karl Pearson's coefficient of correlation lies between
      a)   0 and 1   b)   −1 and 1
      c)   −1 and 0   d)   −3 and 3

   ii) The number of normal equations required to fit the curve $Y = a + bX + cX^2$
        are _____
      a)   Four   b)   Two
      c)   One   d)   Three

   iii) In a trivariate data on (X_1, X_2, X_3), Partial regression coefficient $b_{13.2}$
        indicates.
      a) X_1 is dependent variable and X_3 is independent variable.
      b) X_2 is dependent variable and X_3 is independent variable.
      c) X_1 is dependent variable and X_3 is also dependent variable.
      d) X_3 is dependent variable and X_3 is independent variable.

   iv) In time series, the component having period of oscillation less than one
        year is
      a)   Trend   b)   Cyclical variations
      c)   Seasonal variations d)   Random variations

P.T.O.

Q2) Attempt any Five of the following: **[2 each]**
    a)   Define positive correlation. Give one illustration.
    b)   For a certain bivariate data the least square lines of regression are $3x - y = 5$ and $4x - 3y = 0$. Obtain means of X and Y.
    c)   Define coefficient of determination and state its interpretation.
    d)   State the types of correlation for the following.
        i)   Weight and blood pressure of individuals.
        ii)   Supply and price of vegetables
    e)   Define partial correlation coefficient.
    f)   State two situations where multiple regression analysis is used.
    g)   State the components of time series.
    h)   Draw scatter diagram when X and Y have
        i)   high positive correlation
        ii)   perfect negative correlation

Q3) Attempt any TWO of the following: **[4 each]**
    a)   Explain the concept of multiple correlation in case of trivariate data. Also, state the expression for multiple correlation coefficient $R_{1.23}$.
    b)   Five entries at a musical competition were rated by two judges X and Y as follows:

Ranks by X	1	5	2	3	4
Ranks by Y	1	5	4	2	3

        Compute Spearman's rank correlation between X and Y.
    c)   Describe the stepwise procedure of fitting a line of regression of Y on X to the bivariate data by using method of least squares.

Q4) Attempt any TWO of the following: **[4 each]**
    a)   Explain the terms with one illustration:
        i)   Bivariate data
        ii)   Correlation
    b)   Define regression coefficients and state it's any two properties.
    c)   What is time series? Explain Seasonal variation as a component of time series.

Q5) Attempt any ONE of the following: **[5 each]**
    a)   Describe the moving average method used for the estimation of trend.
    b)   If $\bar{X}_1 = \bar{X}_2 = \bar{X}_3 = 0$, $\sigma_1 = \sigma_2 = \sigma_3 = 1$, $r_{12} = r_{13} = r_{23} = \rho$ then find the equation of regression plane of X_1 on X_2 and X_3.

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[5902]-28
F.Y. B.Sc. (Computer Science)
STATISTICS
CSST 122 : Continuous Probability Distributions and Testing of Hypothesis
(2019 Pattern) (Semester - II) (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: **[1 each]**

   a)   If X and Y are independent normal variates such that $X \rightarrow N(5,9)$ and

   $Y \rightarrow N(4,25)$ then the distribution of $X + Y$ is

   i)   N(1, 16)   ii)   N(9,16)

   iii) N(9, 34)   iv)   N(1,16)

   b)   While checking the equality of two population variances the test statistic
        follows
        i)   chi-square-distribution   ii)   t-distribution
        iii) normal distribution   iv)   F-distribution

   c)   Type - I error is
        i)   acceptance of H_0 when it is false
        ii)   rejection of H_0 when it is true.
        iii) acceptance of H_1 when it is false
        iv)   rejection of H_1 when it is true.

d) To draw a random sample of normal distribution, which of the following methods is useful
   i) Square root transformation
   ii) Log transformation
   iii) Box Muller transformation
   iv) Inverse transformation

Q2) Attempt any Five of the following: [5×2=10]

a) State the lack of memory property of exponential distribution with mean θ.

b) State mean and variance of Pareto distribution with parameter α.

c) Let X follows continuous Uniform distribution over (5, 10), find mean and variance of X.

d) Distinguish between parameter and statistic.

e) Define the terms 'Level of Significance' and 'Critical Region'.

f) State the test statistic along with its distribution under H_0 for testing the independence of two attributes.

g) State any two properties of normal distribution.

h) State any two advantages of simulation.

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

a) The life time of a certain battery is a random variable which has an exponential distribution with mean 320 hours. Find the probability that such a battery will last at most 160 hours. Also, find the probability that such a battery will last between 640 to 960 hours.

b) Describe the large sample test for testing $H_0 : \mu_1 = \mu_2$ against the alternative $H_1 : \mu_1 > \mu_2$.

c) Describe the Chi-square test for independence of two attributes in 2×2 contingency table.

Q4) Attempt any TWO of the following: [2×4=8]

a) A circuit is said to be fault-free if 50% of the outputs are "ones". To test Whether the given circuit is fault-free 100 inputs were given and 37 of them resulted in output as "one" and remaining in "zero". At 1% level of significance, test whether the circuit is fault-free.

b) Explain F-test for testing $H_0 : \sigma_1^2 = \sigma_2^2$ against the alternative $H_1 : \sigma_1^2 \neq \sigma_2^2$.

c) Define Uniform distribution over (a, b). State its distribution function. Also describe the procedure of drawing a random sample from it.

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

a) Explain the paired t-test and state the underlined assumptions.

b) The table below gives the number of customers visiting a certain Post office on various days of the week:

Days	Mon	Tue	Wed	Thurs	Fri	Sat
No. of books issued	120	130	110	115	135	110

Test whether the customers visiting the post office are uniformly distributed over a week. Use 5% level of significance.

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[5902]-31

S.Y.B.Sc. (Computer Science)
CS 231 : DATA STRUCTURES AND ALGORITHMS - I
(2019 CBCS Pattern) (Semester - III) (23121)

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.*
    3)   *Your answers will be values as a whole.*

Q1) Attempt any Eight of the following.   **[8×1=8]**

    a)   Define Data Object.

    b)   Define stable sorting.

    c)   List Linear search variations.

    d)   What is time complexity of merge sort?

    e)   Define the term null list.

    f)   Write any two applications of linked list.

    g)   Write node structure of doubly linked list.

    h)   What is Top of the stack?

    i)   Define Recursion.

    j)   What is circular queue?

Q2) Attempt any Four of the following.   **[4×2=8]**

    a)   Describe the term ADT.

    b)   What is the best case and worst case efficiency of quick sort?

    c)   What is divide and conquer strategy?

    d)   Justify true or false: "A linked list can only be traversed sequentially".

    e)   Define the following terms.

        i)   Stack overflow.

        ii)   Stack underflow.

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

a) Write a program to search an element using linear search algorithm.

b) Write a C function to reverse a string using stack.

c) Write a C function to delete a node from singly circular linked list at any position.

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

a) Sort the following elements using bubble sort algorithm.

89 29 39 79 59 49 69 19

b) Convert the following infix expression into postfix expression.

P * Q + R / S – T

c) Define Deque. List types of Deque and explain any two operations performed on Deque.

Q5) Attempt any ONE of the following. **[1×3=3]**

a) Define the following terms.

i) Data Structure.

ii) Omega Notation.

iii) Time Complexity.

b) Write a short note on priority queue.

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[5902]-32

S.Y.B.Sc. (Computer Science)
CS 232 : SOFTWARE ENGINEERING
(2019 CBCS Pattern) (Semester - III) (23122)

Time : 2 Hours]   *[Max. Marks : 35*
Instructions to the candidates:
　　1)　All questions are compulsory.
　　2)　Neat diagrams must be drawn if necessary.

Q1) Attempt any EIGHT of the following.   **[8×1=8]**

　　a)　What is a unified process?

　　b)　What is ASD?

　　c)　List the goals of Software Engineering.

　　d)　What is elicitation?

　　e)　What is negotiation?

　　f)　Draw a symbol of extend.

　　g)　Define : Association.

　　h)　List of UML diagrams (any Two).

　　i)　What is software design?

　　j)　Define : data Abstraction.

Q2) Attempt any FOUR of the following.   **[4×2=8]**

　　a)　What is system software and Application Software?

　　b)　What are the advantages of scrum?

　　c)　What is class and object?

　　d)　What is Actor?

　　e)　What are the elements of design model?

Q3) Attempt any TWO of the following. [2×4=8]

    a) Define terms:

        i) Agile Method

        ii) Agile Process

    b) What is software requirement specification?

    c) What is modularity? Explain its benefits.

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

    a) Explain advantages and disadvantages of spiral model.

    b) Define terms:

        i) Active class

        ii) Component

        iii) Artifact

        iv) Node

    c) Describe component diagram in brief and draw a component diagram for online shopping.

Q5) Attempt any ONE. [1×3=3]

    a) Explain any three notation of activity diagram with each notation symbols.

    b) Explain water fall model with diagram.

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[5902]-33
S.Y. B.Sc. (Computer Science)
MATHEMATICS
MTC - 231 : Groups and Coding Theory
(23221) (2019 Pattern) (Semester - III) (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) *Non-programmable scientific calculator is allowed.*

Q1) Attempt any Five of the following.   **[5×2=10]**

a) Define term 'Group'.

b) Find g.c.d. of 125 and 160.

c) Find remainder after dividing 111^{111} by 2.

d) Let $(\mathbb{Z},+)$ be a group of integers. Find additive identity element of $(\mathbb{Z},+)$.

e) Find equivalence class of $\overline{2}$ in $(\mathbb{Z}_8,+_8)$.

f) Find Hamming distance between 1010101 and 0101010.

g) Find value of x, in $25 \equiv x \pmod 3$

Q2) Attempt any Three of the following: **[3×5=15]**

a) Let L is set of all lines in plane. Define relation R on L as ^aR_b if and only if line a is parallel to line b. Is R equivalence Relation on L? Justify your answer.

b) Find all permutations of group S_3 on A, where $A=\{1,2,3\}$.

c) Let $(Z_{10}^*,*_{10})$ group of prime integers of 10 under multiplication modulo 10 operation. Find inverse of all elements in Z_{10}^*.

d) If $\mu = (1\ 3\ 5\ 7)$ and $\sigma = (2\ 4\ 6\ 8)$ in S_8, find $\mu\sigma\mu^{-1}$.

e) Consider the encoding function $e_H : B^2 \to B^5$ with group codes $N = \{00000,\ 10101,\ 01011,\ 11110\}$ decode the words 11101 and 01110.

Q3) Attempt any one of the following: [1×10=10]

a) i) Using encoding function $f(x) = 3x + 23 \bmod 26$ encode the word 'MAN'.

    ii) Let $\mathbb{Z}_{12} = \{\bar{0}, \bar{1}, \bar{2}, \dots \overline{11}\}$ be the group of residue classes under addition modulo 12. Find all non-trivial subgroups of Z_{12}.

b) Find g.c.d. of 4027 and 2997. Find integers *m* & *n* such that $(4027, 2997) = m\,(4027) + n(2997)$.

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[5902]-34

S.Y. B.Sc. (Computer Science)
MATHEMATICS (Paper - II)
MTC - 232 : Numerical Techniques
(2019 Pattern) (Semester - III) (23222)

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 questions out of seven: **[5×2=10]**

   a) Find percentage error of the number 5/9 whose approximate value is 0.56.

   b) Prove that : $E\nabla = \Delta$ by usual notations.

   c) Let $f(x) = 1/x$, find divided difference $[a, b, c]$

   d) Given that $f(1) = 1, f(2) = 4, f(3) = 9, f(4) = 16$ and $f(5) = 25$. Find $\int_1^5 f(x)dx$ using Trapezoidal rule.

   e) Using Euler's method find $y(0,1)$ given that $\frac{dy}{dx} + 2y = 0$ with $y(0)=1$.

   f) Write Simpson's (3/8)th formula for numerical integration.

   g) Evaluate Δx^2 with $h = 1$.

Q2) Attempt any three of the following: **[3×5=15]**

   a) Derive Newton's forward Interpolation formula for equal intervals.

   b) Find the real root of the equation $x^3 - x - 4 = 0$ in the interval $[1, 2]$ correct upto 2 decimal places by using Regula Falsi method.

   c) Using Lagrange's Interpolation find $f(2)$ given that $f(1) = 1, f(3) = 27, f(4) = 64$.

   d) Evaluate $\int_0^6 \frac{1}{1+x} dx$ by using Simpson's $(1/3)^{rd}$ rule. Take $h = 1$.

P.T.O.

e) Find the missing value of the data:

x	1	2	3	4	5
$f(x)$	7	-	13	21	31

Q3) Attempt any one of the following: **[1×10=10]**

a) Evaluate $\sqrt{12}$ correct upto four decimal places by Newton-Raphson method.

b) Derive Trapezoidal rule of integration for the function $f(x)=0$.

c) Solve $\dfrac{dy}{dx} = x+y$ with $y(0)=1$. Find $y(0.1)$ and $y(0.2)$ by using Runge-Kutta method of fourth order.

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[5902]-35

S.Y. B.Sc. (Computer Science)
ELECTRONICS (Paper - I)
ELC - 231 : Microcontroller Architecture &Programming
(2019 Pattern) (Semester - III) (23321)

Time : 2 Hours]   *[Max. Marks : 35*

Instructions to the candidates:

   1)   *Q.1 is compulsory.*

   2)   *Solve any three questions from Q.2 to Q.5.*

   3)   *Figures to the right indicate full marks.*

   4)   *Neat diagrams must be drawn wherever necessary.*

   5)   *Use of calculator is allowed.*

Q1) Attempt any five.   **[5×1=5]**

   a)   What is the size of address and data bus of 8051 Microcontroller?

   b)   Define step angle of stepper motor.

   c)   Which special function register is used to keep track of priority of interrupts?

   d)   Which Pin of LCD is used for controlling its contrast?

   e)   List any two assembler directives of 8051 microcontroller?

   f)   State the role of $C/\overline{T}$ in TMOD register?

Q2) Answer the following.   **[2×5=10]**

   a)   Explain the function of following pins of 8051 microcontroller?

       i)   ALE

       ii) $\overline{\text{PSEN}}$

       iii) $\overline{\text{EA}}$

       iv)   RESET

       v)   RXD

   b)   Explain addressing modes of 8051 micro controller. (Any Five)

P.T.O.

Q3) Answer the following. **[2×5=10]**

a) Write 8051 C - program to generate 4 kHz square wave on port pin $P_{1.2}$ using timer 0 in auto reload mode? [Assume XTAL = 12 MHz]

b) Explain the function of following instructions.

    i) Mov A, @ Ro

    ii) CPL bit

    iii) djNz R_2, Next

    iv) RR A

    v) SUBB A, B

Q4) Answer the following. **[2×5=10]**

a) Draw block diagram to interface DAC 0808 with 8051 microcontroller. Write a C-program to generate triangular waveform.

b) Write any five features of 8051 micro controller.

Q5) Write a short note on any four of the following. **[4×2.5=10]**

a) Stepper motor.

b) Register banks in 8051 micro controller.

c) Data types used for 8051 C-program.

d) Logical instructions. (any three)

e) TCON register.

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[5902]-36
S.Y. B.Sc. (Computer Science)
ELECTRONICS
ELC - 232 : Digital Communication and Networking
(23322) (2019 Pattern) (Semester - III) (Paper - II)

Time : 2 Hours]   *[Max. Marks : 35*

Instructions to the candidates:
1) *Q.1 is compulsory.*
2) *Solve any three questions from Q.2 to Q.5.*
3) *Figures to the right indicate full marks.*
4) *Neat diagrams must be drawn wherever necessary.*
5) *Use of calculator is allowed.*

Q1) Attempt any five.   **[5×1=5]**

   a)   What is meant by Noise Figure?

   b)   What is quantization error in PCM?

   c)   Define multiplexing technique.

   d)   What is meant by CSMA/CD?

   e)   List any two types of Ethernet.

   f)   Comment : "Star topology is widely used in LAN".

Q2) Answer the following.   **[2×5=10]**

   a)   Explain simplex and Half duplex transmission modes of communication system.

   b)   Explain concept of TDM.

Q3) Answer the following.   **[2×5=10]**

   a)   Differentiate between asynchronous and synchronous communication.

   b)   Explain OSI model in brief.

Q4) Answer the following.   [2×5=10]

    a)   List any five features of FDMA.

    b)   Describe in brief LAN and WAN.

Q5) Write a short note on <u>any four</u> of the following.   [4×2.5=10]

    a)   Any two internal noise.

    b)   Channel capacity and data rate.

    c)   Token passing protocol.

    d)   Reservation protocol.

    e)   Bus topology.

    f)   Switch networking device.

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[5902]-37

S.Y. B.Sc.(Computer Science/Bio-technology/B.C.A./Animation)
ENGLISH ABILITY ENHANCEMENT COURSE
AECC-II : Language Communication - I
(CBCS) (2019 Pattern) (Semester - III) (23922)

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 one of the following in about 150-200 words: **[15]**

    a)   Describe the last scene of the story <u>A Shadow</u>.

    b)   Write a detailed note on the supernatural element used in the poem <u>La Belle Dame Sans Merci</u>.

Q2) Attempt any two of the following in about 50-80 words: **[10]**

    a)   As an anchor for the Prize Distribution Ceremony at your college, introduce the chief guest of the programme.

    b)   Frame a dialogue on the police authorities refusing the permission to organize a public meeting on the street.

    c)   As a Fitness Trainer describe your daily routine.

Q3) Attempt any two of the following in about 50-80 words: **[10]**

    a)   Write a resume for the rest of a website developer.

    b)   Write a note on the tips and techniques of Group Discussion.

    c)   Prepare a power point presentation of five slides on newly laurened electric vehicle.

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[5902]-38

S.Y. B.Sc. (Computer Science)/(Biotech.)/(Animation) (HS)/B.C.A.
(ABILITY ENHANCEMENT COMPULSORY COURSE)
AECC - Environmental Awarness / Studies
(2019 Pattern) (2021 Pattern) (Semester - III) (Paper - I)

Time : 2 Hours]
[Max. Marks : 35

Instructions to the candidates:

1)   Question 1 is compulsory.

2)   Solve any Three questions from Question No. 2 to Question No. 5.

3)   Question No. 2 to Question No. 5 carry equal marks.

Q1) **Attempt any Five of the following :**
[5]

a)   Define Environment.
[1]

b)   What is an aquifer?
[1]

c)   Define Ecology & Ecosystem?
[1]

d)   Define Eutrophil?
[1]

e)   What is Red data book?
[1]

f)   What is the full form of NBPGR.
[1]

Q2) **Answer the following :**

a)   What are renewable & Non-renewable resources? Give example.
[6]

b)   What is the Scope of Environmental Studies?
[4]

Q3) **Answer the following :**

a)   Discuss the models of energy flow in an ecosystem.
[6]

b)   What are the major threats to Biodiversity.
[4]

P.T.O.

Q4) **Answer the following :**

a) What is mean by Insitu & Exsitu conservation of Biodiversity? Give example. **[6]**

b) What are Hotspots of Biodiversity. **[4]**

Q5) **Write a short note on any Four of the following :** **[10]**

a) Scope of Environmental Study **[2½]**

b) Soil erosion. **[2½]**

c) Ecological Succession. **[2½]**

d) Food chain & food web. **[2½]**

e) Trophic level. **[2½]**

f) Deforestation.

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[5902]-38

S.Y. B.Sc. (Computer Science)/(Biotech.)/(Animation) (HS)/B.C.A
(ABILITY ENHANCEMENT COMPULSORY COURSE)
AECC - Environmental Awarness / Studies
(2019 Pattern) (2021 Pattern) (Semester - III) (Paper - I)

(मराठी रूपांतर)

वेळ : 2 तास]   [एकूण गुण : 35

सूचना :   1)   प्रश्न क्रं. 1 अनिवार्य आहे.

2)   प्रश्न क्रं. 2 ते 5 मध्ये कोणतेही तीन प्रश्न सोडवा.

3)   प्रश्न क्रं. 2 ते 5 यांना समान गुण आहेत.

प्रश्न 1)   खालीलपैकी कोणतेही पाच प्रश्न सोडवा.   [5]

अ)   पर्यावरण म्हणजे काय?   [1]

ब)   जलयुक्त खडक म्हणजे काय?   [1]

क)   पर्यावरणशास्त्र व परिसंस्था म्हणजे काय?   [1]

ड)   युट्रॉफिकेशन म्हणजे काय?   [1]

इ)   रेड डाटा बुक म्हणजे काय?   [1]

फ)   एन्.बी.पी.जी.आर चा पुर्ण वाक्य काय आहे?   [1]

प्रश्न 2)   अ)   पुननिर्मित होणाऱ्या व पुननिर्मित न होणाऱ्या साधनसंपत्तीची माहिती द्या.   [6]

ब)   पर्यावरणशास्त्राची व्याप्ती म्हणजे काय?   [4]

प्रश्न 3)   अ)   ऊर्जा प्रवाह करणारे मॉडेल म्हणजे काय स्पष्ट करा.   [6]

ब)   जैवविविधतेला कोणत्या गोष्टींचा धोका आहे?   [4]

प्रश्न 4)   अ)   जैवविविधतेचे अधिवास बाह्य व अधिवास अंतर्गत संबधीत म्हणजे काय? उदाहरणासहीत
स्पष्ट करा.   [6]

ब)   जैवविविधतेची संपन्न ठिकाणे कोणती?   [4]

प्रश्न 5)	खालीलपैकी कोणतेही चार वर टिपा लिहा.	[10]

अ)	पर्यावरणशास्त्राची व्याप्ती स्पष्ट करा.	[2½]

ब)	जमिनीची धूप	[2½]

क)	पर्यावरणीय उत्तराधिकार / परिस्थितीकीय अनुक्रमण	[2½]

ड)	अन्नसाखळी व अन्नजाळे	[2½]

इ)	ऊर्जाप्रवाह स्तर	[2½]

फ)	जंगलतोड / वृक्षतोड	[2½]

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[5902]-41

S.Y. B.Sc. (Computer Science)
CS-241 : DATA STRUCTURES & ALGORITHMS - I
(CBCS) (2019 Pattern) (Semester - IV)

Time : 2 Hours]   *[Max. Marks : 35*

Instructions to the candidates :
1) *Neat diagrams must be drawn wherever necessary.*
2) *Figures to the right indicate full marks.*

Q1) Attempt any Eight of the following: **[8 × 1 = 8]**
     a)   Define degree of a tree.
     b)   Define the term left skewed binary tree.
     c)   What is height balance tree?
     d)   List 2 applications of graph.
     e)   What is topological sorting?
     f)   Define Bucket.
     g)   What is collision?
     h)   Define complete Binary tree.
     i)   What is weighted graph?
     j)   Explain open addressing concept in hash table.

Q2) Attempt any four of the following: **[4 × 2 = 8]**
     a)   Traverse the following binary tree using given traversal technique
         i)   Inorder   ii)   Postorder.
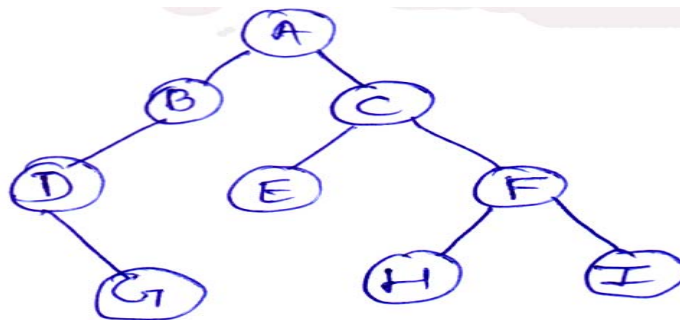
b) Compare B tree & B+ tree.

c) Define indegree & outdegree of vertex with example.

d) Explain the concept of hushing & rehashing in Hash table.

e) Explain concept of Red - Black Tree.

Q3) Attempt any two: [2 × 4 = 8]

a) Write C program to represent graph as adjacency matrix.

b) Write C Program to compare two BST.

c) Write a program to find minimum value node from the BST.

Q4) Attempt any two: [2 × 4 = 8]

a) Write a program to insert an element into binary tree.

b) Construct AVL tree for the following:

{Mon, Sun, Thur, Fri, Sat, Wed, Tue}

c) Consider the following graph.

Give i)   DFS Traversal

ii)   BFS Traversal.

Q5) Attempt any one of the following: [1 × 3 = 3]

a) Write note on quadratic probing

b) Compare the data structures.

Tree & Graph.

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S.Y. B.Sc.

COMPUTER SCIENCE

CS-242: Computer Networks - I (Paper - II)

(2019 Pattern) (Semester - IV) (24122)

Time : 2 Hours]   *[Max. Marks : 35*

Instructions to the candidates :

    1)   All questions are compulsory.

    2)   Neat diagrams must be drawn wherever necessary.
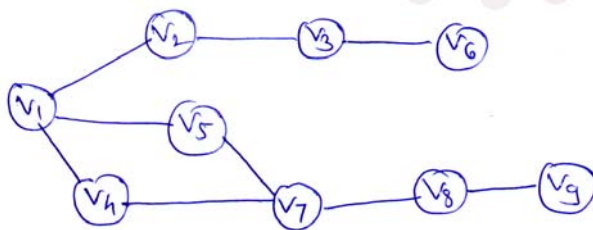
Q1) Attempt any Eight of the following :   **[8 × 1 = 8]**

    a)   List components of data communication.

    b)   What is data communication?

    c)   Define Protocols.

    d)   List any two channelization protocols.

    e)   State any two applications of wireless LAN.

    f)   What is bandwidth?

    g)   Define congestion.

    h)   What is Routing?

    i)   What is a Port Number?

    j)   What is internetworking?

Q2) Attempt any Four of the following : [4 × 2 = 8]

a) What is Computer Network? Write any four characteristics of Computer Network.

b) What is LAN? Write any two advantages of LAN.

c) Consider a noiseless channel with a bandwidth of 4000 Hz transmitting a signal with two signal levels. What will be the maximum bit rate?

d) Write any four application of Bluetooth technology.

e) Change the following IPv4 address from binary notation to dotted decimal notation.
   i)   10000001 00001011 00001011 11101111
   ii) 11000001 10000011 00011011 11111111

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

a) Compare OSI Reference Model and TCP/IP model.

b) Explain the important design issues of the data link layer.

c) Explain the different services offered by the Network layer.

Q4) Attempt any two of the following : [2 × 4 = 8]

a) Write any four differences between Fast ethernet and Gigabit ethernet.

b) Write any eight features of IPv6 protocol.

c) Explain any four features supported by TCP.

Q5) Attempt any one of the following : [1 × 3 = 3]

a) Explain datagram format of UDP.

b) Define Pulling.

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[5902]-43

S.Y. B.Sc. (Computer Science)
MATHEMATICS (Paper - I)
MTC-241: Computational Geometry
(2019 Pattern) (Semester - IV) (24221)

Time : 2 Hours]   *[Max. Marks : 35*

Instructions to the candidates :

    1)   All questions are compulsory.

    2)   Figures to the right indicate full marks.

    2)   Non-programmable scientific calculator is allowed.

Q1) Attempt any Five of the following :   **[5 × 2 = 10]**

   a) Find homogenous co-ordinate of point A = [1, 2].

   b) If $A(\Delta ABC) = 5$ sq. unit is reflected through $y = x$ line, find Area of transformed object.

   c) Find Foreshortening factor f_y of the transformation Matrix for Axonometric projection.

$$[T] = \begin{bmatrix} 0.5 & 0.43 & 0 & 0 \\ 0 & 0.86 & 0 & 0 \\ 0.86 & 0.25 & 0 & 0 \\ 0.58 & 0.75 & 0 & 1 \end{bmatrix}$$

   d) Find direction cosines of the plane $x + y + z = 0$.

   e) Write types of all Axonometric parallel projections.

   f) Define projection in three-Dimensional space.

   g) Find Initial point of part of circle $x^2 + y^2 = 16$ in second quadrant.

Q2) Attempt any three of the following :　　　　　　　　　　　　　**[3 × 5 = 15]**

a) Show that 2 × 2 matrix $[T] = \begin{bmatrix} 2t & \dfrac{1}{t} \\ t & \dfrac{1}{t} \end{bmatrix}$

   represents pure rotation in two-Dimensional space.

b) If circle $(x-1)^2 + (y+1)^2 = 9$ is transformed by translation in X-direction by 2 and Y-direction by 3 then find centre of transformed circle.

c) Find concatenated transformation matrix for the following sequence of transformation, First shearing in Y-direction proportional to x and z co-ordinate with 1 and 3 units respectively. Followed by Reflection through xz plane (i.e. $y = 0$ plane).

d) Obtain transformation matrix to Reflect the object through plane $x = -2$.

e) Develop the bottom view of the line segment AB where A = [0 0 1] and B = [1 0 1].

Q3) Attempt any one of the following :　　　　　　　　　　　　　**[1 × 10 = 10]**

a) Find the parametric equation of Be'zier curve determine by four control points B_0 [0 2], B_1 [2 3] B_2 [3 2] and B_3 [2 0]. Also find position vectors of the point on the curve corresponding to parametric values $t = 0.2, 0.4, 0.6$.

b) i)　Generate equispaced 3 points on the circle $x^2 + y^2 = 36$ in second quadrant only.

　　ii)　Write the transformation matrix for dimetric projection with

$$f_z = \frac{3}{8} (\theta > 0, \phi > 0).$$

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S.Y. B.Sc. (Computer Science)
MATHEMATICS
MTC - 242 : Operations Research
(2019 Pattern) (Semester - IV) (Paper - II) (24222)

Time : 2 Hours]   *[Max. Marks : 35*

Instructions to the candidates :
1) *All questions are compulsory.*
2) *Figures to the right indicates full marks.*
3) *Non-programmable scientific calculator is allowed.*

Q1) Attempt any Five of the following :   **[5 × 2 = 10]**

a) Use north-west corner rule to obtain Initial Basic Feasible Solution of the following transportation problem :

Destination → Origin ↓	D_1	D_2	D_3	Supply
O_1	5	1	8	12
O_2	2	4	0	14
O_3	3	6	7	4
Demand	9	10	11	

b) Write dual form of the following Linear Programming Problem :

Minimize $Z = 10x_1 + 6x_2 + 2x_3$

Subject to :

$$-x_1 + x_2 + x_3 \geq 1$$
$$3x_1 + x_2 - x_3 \geq 2$$
$$x_1, x_2, x_3 \geq 0$$

P.T.O.

c) Solve following assignment problem for Maximization :

Jobs → Persons ↓	I	II	III
A	1	4	5
B	2	3	3
C	3	1	2

d) What is degeneracy in the transportation problem?

e) Write the mathematical formulation of assignment problem.

f) Write the standard form of following Linear Programming Problem :

Minimize $Z = x_1 + x_2 + x_3$

Subject to :

$$x_1 - 3x_2 + 4x_3 = 5$$
$$x_1 - 2x_2 \leq 3$$
$$2x_1 - x_3 \geq 4$$
$$x_1, x_2, x_3 \geq 0$$

g) Draw the feasible region for the following constraints :

Maximize $Z = 3x + 2y$

Subject to :

$$x - y \leq 1$$
$$x + y \geq 3$$
$$x, y \geq 0$$

Q2) Attempt any three of the following :   **[3 × 5 = 15]**

a) Obtain Initial Basic Feasible Solution of the following transportation problem by Vogel's approximation method.

Warehouses → Factory ↓	W_1	W_2	W_3	W_4	Supply
F_1	30	25	40	20	100
F_2	29	26	35	40	250
F_3	31	33	37	30	150
Requirement	90	160	200	50	

b) Solve the following assignment problem :

	A	B	C	D	E
M_1	4	6	10	5	6
M_2	7	4	-	5	4
M_3	-	6	9	6	2
M_4	9	3	7	2	3

c) Solve the following linear programming problem by graphically :

Maximize $Z = 3x + 5y$

Subject to :

$$x + 2y \leq 2000$$

$$x + y \leq 1500$$

$$y \leq 600$$

$$x, y \geq 0$$

d) Solve the following Linear Programming Problem by Big-M method.

Maximize $Z = x + 4y$

S.t.

$$x + 2y \leq 2$$

$$4x + 3y \geq 12$$

$$x, y \geq 0$$

e) Solve following assignment problem for minimum cost :

	I	II	III	IV	V
1	3	8	2	10	3
2	8	7	2	9	7
3	6	4	2	7	5
4	8	4	2	3	5
5	9	10	6	9	10

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Q3) Attempt any one of the following :   **[1 × 10 = 10]**

    a)   Obtain optimal solution of the following Transportation Problem by modified distribution method.

1	2	1	4
(20)		(10)	
3	3	2	1
	(20)	(20)	(10)
4	2	5	9
	(20)		

       Also obtain alternate optimal solution

    b)   Solve the following linear programming problem by simplex method :

Maximize $Z = 3x_1 + 2x_2 + 5x_3$

Subject to :

$$x_1 + 2x_2 + x_3 \le 430$$
$$3x_1 + 2x_3 \le 460$$
$$x_1 + 4x_2 \le 420$$
$$x_1, x_2, x_3 \ge 0$$

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[5902]-45
S.Y. B.Sc. (Computer Science)
ELECTRONICS
ELC - 241 : Embedded System Design
(2019 Pattern) (Semester - IV) (Paper - I) (24321)

Time : 2 Hours]   *[Max. Marks : 35*

Instructions to the candidates :
1) *Q.1 is compulsory.*
2) *Solve any three questions from Q.2 to Q.5.*
3) *Figures to the right indicate full marks.*
4) *Neat diagrams must be drawn wherever necessary.*
5) *Use of calculator is allowed.*

Q1) Attempt <u>any Five</u> :   **[5 × 1 = 5]**
- a) State any two characteristics of an embedded system.
- b) What is SoC?
- c) State any two Features of Raspbian OS.
- d) List the logical operators in python.
- e) What is the significance of GPIO·cleanup ( ) Function?
- f) State applications of PIR sensors.

Q2) Answer the following :   **[2 × 5 = 10]**
- a) i) Explain time·ctime ( ), time·clock ( ) and time. Striuct_time functions used in python. **[3]**
  - ii) Write a python program for the division of two numbers. **[2]**
- b) Draw neat block diagram of Single Board Computer and explain any three blocks. **[5]**

Q3) Answer the following :   **[2 × 5 = 10]**
- a) Write a short on peripherals used in BCM2835. **[5]**
- b) Explain the following statements. **[5]**
  - i) Break   ii) Pass
  - iii) Continue   iv) Try
  - v) Range

Q4) Answer the following :   **[2 × 5 = 10]**

    a)   Explain the interfacing of a switch to Raspberry Pi with the help of neat diagram and write a python program for the same.   **[5]**

    b)   List at least four types of Keyboards. Explain membrane and mechanical Keyboard in detail.   **[5]**

Q5) Write a short notes on <u>any Four</u> of the following :   **[4 × 2.5 = 10]**

    a)   Types of memories.

    b)   Branch prediction and folding.

    c)   Bitwise operators used in python.

    d)   Operating systems used for Raspberry Pi.

    e)   CPU pipeling stages.

    f)   Bluetooth Module.

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[5902] - 46

S.Y. B.Sc. (Computer Science)
ELECTRONICS
ELC 242 - Wireless Communication and Internet of Things
(2019 Pattern) (Semester - IV) (Paper - II) (24322)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates :

1) *Q. 1 is compulsory.*
2) *Solve any three questions from Q.2 to Q.5.*
3) *Figures to the right indicate full marks.*
4) *Use of calculator is allowed.*

Q1) Attempt **any Five** of the following : **[5 × 1 = 5]**

a) State the technique used to avoid interference between the neighbouring base stations.

b) Which type of RFID tag uses battery?

c) State the name of the topology not supported by Zigbee network.

d) What is full form of IoT?

e) What do you mean by M2M communication?

f) State any two challenges faced while implementing IoT.

Q2) Answer the following : **[2 × 5 = 10]**

a) Draw neat diagram and explain architecture of smart home system.

b) Write comparison between Bluetooth and Zigbee.

P.T.O.

Q3) Answer the following :　　　　　　　　　　　　　　　　　　　**[2 × 5 = 10]**

    a)　Explain three segments of GPS.

    b)　i)　State the advantages of wireless communication.

        ii)　What is frequency reuse concept of cellular telephony system.

Q4) Answer the following :　　　　　　　　　　　　　　　　　　　**[2 × 5 = 10]**

    a)　Compare wired and wireless communication.

    b)　Differentiate between M2M and IoT.

Q5) Write a short note on **<u>any Four</u>** of the following :　　　　**[4 × 2½ = 10]**

    a)　Public Cloud.

    b)　Secure Connectivity and secure data storage in IoT.

    c)　Disadvantages of Zigbee.

    d)　The error sources of GPS to locate position.

    e)　Classes of GPRS devices.

    f)　"Handoff" in cellular telephony system.

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SEAT No. :

[Total No. of Pages : 1

[5902]-47

S.Y. B.Sc.(Computer Science / Biotechnology)
AECC-II : LANGUAGE COMMUNICATION - II
(2019 Pattern) (Semester - IV) (Paper - I) (24922)

Time : 2 Hours]   *[Max. Marks : 35*
Instructions to the candidates :
    1)   *All the questions are compulsory.*
    2)   *Figures to the right indicate full marks.*

Q1) Attempt any one of the following in about 150-200 words.   **[15]**

    a)   How did the narrator realize that Todd has completely forgotten that he owed the narrator a Dollar?

    b)   What message do you get by the last stanza of the poem

         'Stopping by Woods on a Snowy Evening'?

Q2) Attempt any two of the following in about 50-80 words.   **[10]**

    a)   NSS Department of your college has organized Blood Donation Camp. Draft a notice to all the students of your college for inviting them to donate blood.

    b)   As a secretary of students council, prepare the minutes of the meeting on 'Planning of extra-curricular activities'.

    c)   Explain the importance of content writing in Blogs and social media sites.

Q3) Attempt any two of the following in about 50-80 words.   **[10]**

    a)   Without soft skills, hard skills doesn't have any importance. Discuss.

    b)   Why it is important to do SWOT analysis before any venture?

    c)   Explain Project Management.

▽ ▽ ▽ ▽

[5902]-48

S.Y. B.Sc./B.C.A.

(Computer Science/Biotech./HS)

ENVIRONMENTAL SCIENCE

AECC - Environmental Awareness

(2019 Pattern) (Semester - IV)

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)   *Questions from 2 to 5 carries equal marks.*

Q1) Solve any five of the following :   **[5]**

a)   Define the term air pollution?

b)   What is meant by solid waste management?

c)   What is the main aim of Qyoto protocol?

d)   Name two gases that are mainly responsible for acid rain?

e)   Which layer of atmosphere contains the ozone layer?

f)   Why Environmental Laws are important?

Q2) a)   Write causes, effects and control measures for water pollution?   **[6]**

b)   How human health risks caused by nuclear hazards.   **[4]**

Q3) a)   Discuss the role of Indian and other religions and cultures in Environmental conservation.   **[6]**

b)   What are the aims and objectives of Environmental Protection Act?   **[4]**

Q4) a) Describe human wildlife conflicts in Indian context. **[6]**

b) Explain chipko movement? **[4]**

Q5) Write short note on any four of the following : **[10]**

a) Natural reserved areas

b) Climate change

c) Water (prevention and control of pollution) Act

d) Convention on biological diversity

e) Bishnois of Rajsthan

f) Soil pollution

▽ ▽ ▽ ▽

PA-2656

[5902]-48

S.Y. B.Sc./B.C.A.

(Computer Science/Biotech./HS)

ENVIRONMENTAL SCIENCE

AECC - Environmental Awareness

(2019 Pattern) (Semester - IV)

(मराठी रूपांतर)

वेळ : 2 तास]   [एकूण गुण : 35

सूचना :   1)   प्रश्न 1 अनिवार्य आहे.

2)   प्रश्न 2 ते 5 कोणतेही तीन प्रश्न सोडवा.

3)   प्रश्न 2 ते 5 मधील प्रश्नांना समान गुण आहेत.

प्रश्न 1)   खालीलपैकी कोणतेही पाच प्रश्न सोडवा.   [5]

अ)   वायू प्रदूषण या शब्दाची व्याख्या करा?

ब)   घनकचरा व्यवस्थापन म्हणजे काय?

क)   क्योटो प्रोटोकॉल चे मुख्य उद्दिष्ट काय आहे?

ड)   आम्ल पावसासाठी मुख्यत: जबाबदार असलेल्या दोन वायूंची नावे सांगा?

इ)   वातावरणाच्या कोणत्या थरात ओझोन चा थर असतो?

फ)   पर्यावरणीय कायदे महत्वाचे का आहेत?

प्रश्न 2)   अ)   जलप्रदूषणाची कारणे, परिणाम आणि नियंत्रणाचे उपाय लिहा.   [6]

ब)   आण्विक धोक्यांमुळे मानवी आरोग्याला कसा धोका निर्माण होतो?   [4]

प्रश्न 3)   अ)   पर्यावरण संवर्धनामध्ये भारतीय आणि इतर धर्म आणि संस्कृतींच्या भूमिकेची चर्चा करा?[6]

ब)   पर्यावरण संरक्षण कायद्याची उद्दिष्टे काय आहेत?   [4]

प्रश्न 4)   अ)   मानवी वन्यजीव संघर्षाचे भारतीय संदर्भ घेऊन वर्णन करा?   [6]

ब)   चिपको आंदोलनाचे स्पष्टीकरण द्या?   [4]

P.T.O.

प्रश्न 5)   खालीलपैकी कोणतेही चार लहान टीप लिहा.   **[10]**

अ)   नैसर्गिक राखीव जमिनी

ब)   हवामान बदल

क)   पाणी (प्रदूषण प्रतिबंध आणि नियंत्रण) कायदा

ड)   जैविक विविधतेवरील अधिवेशन

इ)   राजस्थान चे बिश्नोई

फ)   भूमी प्रदूषण

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[5902]-51

T.Y. B.Sc. (Computer Science)
CS-351 : OPERATING SYSTEMS-I
(CBCS) (2019 Pattern) (Semester - V) (Paper - I)

Time : 2 Hours]   *[Max. Marks : 35*

Instructions to the candidates :

1) *All questions are compulsory.*
2) *Figures to the right inddicate full marks.*
3) *Use suitable data if necessary.*

Q1) **Attempt any Eight of the following** :   **[8 × 1 = 8]**

a) What is a shell?

b) Define the I/O Bound process.

c) Define the term semaphore.

d) What is a thread library?

e) What is synchronisation?

f) What is physical address space?

g) What is context switching?

h) What is page?

i) Define the term dispatcher?

j) What is booting?

Q2) **Attempt Any Four of the following** :   **[4 × 2 = 8]**

a) Write advantages of distributed operating systems.

b) Compare preemptive and non preemptive scheduling?

c) List out functions of memory management.

d) List the types of schedulars and also explain short term schedulars in detail.

e) Define independent and dependent processes.

Q3) **Attempt <u>Any Two</u> of the following** : **[2 × 4 = 8]**

a) Explain multi threading model in detail.

b) Which three requirements must be satisfied while designing a solutions to the critical section problem? Explain in detail.

c) Consider the following set of processes with the length of cpu burst time and arrival time in milliseconds.

processes	B.T	A.T
P1	5	1.5
p2	1	0
p3	2	2
p4	4	3

Compute total waiting time and turnaround time using preemptive SJF. scheduling algorithm

Q4) **Attempt <u>Any Two</u> of the following** : **[2 × 4 = 8]**

a) Describe PCB with all its fields.

b) Explain bounded buffer problem in detail.

c) Consider the following reference string and find out the total number of page faults using OPT and FIFO. Assume no of frames are 3

1,2,3,4,2,1,5,6,2,1,2,3,7,6,3,2,1,2,3

Q5) **Attempt <u>Any One</u> of the following** : **[1 × 3 = 3]**

a) Differentiate between client server and peer to peer computing environments

b) Describe segmentation in detail.

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[5902]-52

T.Y. B.Sc (Computer Science)

COMPUTER NETWORKS - II

(2019 Pattern) (Semester - V) (CS-352)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) *Attempt all questions.*

2) *Neat diagrams must be drawn wherever necessary.*

3) *Figurers to the right indicate full marks.*

4) *Assume suitable data if necessary.*

Q1) **Attempt any EIGHT of the following (out of TEN)** **[8 × 1 = 8]**

a) What is PrimaryServer?

b) Write services provide by user agents, and explain composing message?

c) Define Jitter and Translation.

d) What is sampling?

e) Define cryptanalysis.

f) What is S-box component of a modern block cipher?

g) Write name of steps perform in each round of DES (Data Encryption Standard) Cipher.

h) What is the purpose of IPSec?

i) Write name of protocols on which IKE (Internet Key Exchange) is based.

j) A proxy firewall is also called application gateway. Write true or false and also justify.

Q2) **Attempt any FOUR of the following (out of FIVE)** [4 × 2 = 8]

  a) What is firewall? Explain with diagram.

  b) What is streaming audio/video? Also write examples.

  c) Write information about iterative resolution, with diagram.

  d) What is anonymous FTP?

  e) What is Digital Signature?

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

  a) Explain security services for message.

  b) Explain streaming stored audio/video Third Approach: Using a media server.

  c) Explain any four user agent services.

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

  a) What is IMAP4? Write it's features, advantages and disadvantages.

  b) Explain asymmetric key cryptography with the help of diagram.

  c) Explain in detail packet filter firewall, also write it's advantages and disadvantages.

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

  a) Using columnar transposition cipher, convert following plaintextto ciphertext. 'allthepacketsfromporttenareallowed", key="COMPUTER"

  b) Write note on Real-Time Transport protocol (RTP).

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SEAT No. :

[Total No. of Pages : 2

[5902]-53

T.Y. B.Sc (Computer Science)
WEB TECHNOLOGIES - I
(2019 Pattern) (Semester - V) (CS-353)

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 (out of Ten)**   **[8 × 1 = 8]**

   a)   Which tag is used to set the text in Superscript format?

   b)   Explain the use of <Style>

   c)   What is difference between echo ( ) and print ( ) function?

   d)   Which construct is used to define an array?

   e)   How to create a directory in PHP?

   f)   Explain any two directory functions.

   g)   What is a DSN?

   h)   Which protocols are used to retrieve mail from server?

   i)   How to convert an object to array?

   j)   Explain SMTP Protocol.

Q2) **Attempt any FOUR of the following (out of Five)**   **[4 × 2 = 8]**

   a)   Differentiate between single quoted string and double quoted string.

   b)   How External CSS is used?

   c)   Write any two functions of decompose string with suitable example.

   d)   How to find out the position of the first occurrence of a substring in a string?

   e)   What is the purpose of array_splice ( ) function?

P.T.O.

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

    a)   Discuss the Scope of a Variable in PHP with an example

    b)   Explain prepare ( ) and execute ( ) command in database handling

    c)   Explain the functions used for reading and writing characters in files.

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

    a)   Design HTML form that will accept user input of user name, Address, provide buttons to submit the input as well as to refresh it.

    b)   Write PHP Script to accept associative array and sort in descending order. Display sorted array to user.

    c)   Accept directory name from user. Write PHP program to change current directory to accepted directory name and count number of files and directories in it.

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

    a)   Explain terms HTTP request and HTTP response.

    b)   Explain the concept of missing parameters to a function with suitable example.

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[5902]-54

T.Y. BSc.

COMPUTER SCIENCE

CS - 354 : Foundation of Datascience

(2019 Pattern) (CBCS) (Semester - V)

Time : 2 Hours]   *[Max. Marks : 35*

Instructions to the candidates:

1) *Figures to the right indicate full marks.*

2) *All questions are compulsory.*

3) *Neat labelled diagrams must be drawn wherever necessary.*

Q1) Attempt any EIGHT of the following :   **[8×1=8]**

a) What is Data science?

b) Define Data source?

c) What is missing values?

d) List the visualization libraries in python.

e) List applications of data science.

f) What is data transformation?

g) Define Hypothesis Testing?

h) What is use of Bubble plot?

i) Define Data cleaning?

j) Define standard deviation?

Q2) Attempt any FOUR of the following.   **[4×2=8]**

a) List the tools for data scientist.

b) Define statistical data analysis?

c) What is data cube?

d) Give the purpose of data preprocessing?

e) What is the purpose of data visualization?

Q3) Attempt any two of the following. [2×4=8]

a) What are the measures of central tendency? Explain any two of them in brief.

b) What are the various types of data available? Give example of each?

c) What is venn diagram? How to create it? Explain with example.

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

a) Explain different data formats in brief.

b) What is data quality? Which factors are affected data qualities?

c) Write details notes on basic data visualization tools?

Q5) Attempt any ONE of the following. [1×3=3]

a) What is outlier? State types of outliers.

b) State and explain any three data transformation techniques.

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[5902]-55

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

CS - 355 : OBJECT ORIENTED PROGRAMMING USING JAVA - I

(2019 Pattern) (Semester - V)

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 : (out of ten)   **[8 × 1 = 8]**

    a)   What is use of Javac?

    b)   Give the name of any two wrapper classes.

    c)   What is use of 'implements' keyword?

    d)   List types of constructor.

    e)   What is use of Array?

    f)   Give the name of any two listeners.

    g)   What is exception?

    h)   Give the syntax of ends with( ) method?

    i)   What is package?

    j)   What is use of new operator?

Q2) Attempt any FOUR of the following. (Out of Five)   **[4 × 2 = 8]**

    a)   'When constructor of class will be called?' Comment.

    b)   What is command line argument? Where they are stored in a program.

P.T.O.

c) What is Frame? Give its any two methods.

d) Differentiate between method overloading and method overriding.

e) Write any two access specifiers.

Q3) Attempt any two of the following. (Out of Three)　　　　　　**[2 × 4 = 8]**

a) Define an interface shape with abstract method area( ). Inherit interface shape into the class traingle.Write a Java Program to calculate area of Triangle.

b) Design the following screen by using swing.

Student details		− □ ×
Roll No.	[ ]	
Name	[ ]	
Percentage	[ ]	
[Display]		[Clear]

Write a Java program to accept the details of student & display an console by clicking on Display button. Clear button should clear all the controls.

c) Write a Java Program to copy the contents form one file into another file. While copying, change the case of cell the alphabets & replace all the digital by '*'.

Q4) Attempt any two of the following. (out of Three)　　　　　　**[2 × 4 = 8]**

a) Differentiate between AWT & Swing.

b) Define user define exception zeronumber Exc. Write a Java program to accept a number from user. If it is zero then throw user define exception "Number is zero" otherwise calculate the sum of first & last digit of given number. (use Static Keyword).

c) Write a Java program to accept n number from user & store only perfect numbers into array & display that array.

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

    a)   Explain uses of final keyword with example.

    b)   Define a class Emp with a member Eid and display() method, inherit
          EmP class into the Emp Name class, Emp Name class having a member
          Ename & display ( ) method. Write a Java program to accept details of
          employee [Eid, Ename] & display it. (Use super keyword).

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[5902]-56

T.Y. B.Sc. (Semester - V)
COMPUTER SCIENCE
CS-356 : Theoretical Computer Science
(2019 Pattern) (CBCS)

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 (Out of TEN). **[8 × 1 = 8]**

a) Define Unit production of grammar.

b) Construct Melay machine which toggles its input.

c) Explain proper Suffix and Prefix of a string with one example.

d) Give formal definition of Push down Automata.

e) Define left linear and right linear grammar.

f) State True or False. Finite Automata has an infinite number of states.

g) Name the types of normal forms of grammar.

h) Write the tuples of LBA.

i) State true or false. Pumping lemma is used to show that language is not context tree.

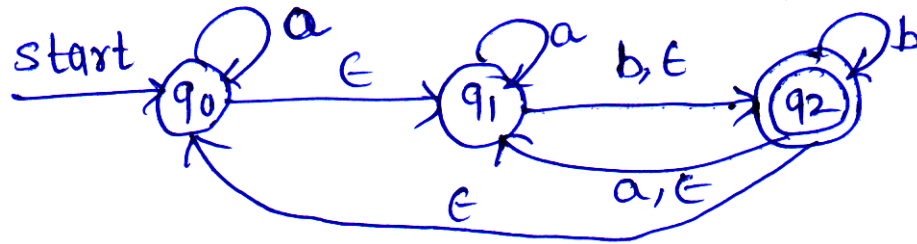j) Write smallest possible string accepted by the following regular expression.

10 + (0 + 11)0*1

Q2) Attempt any FOUR of the following (Out of FIVE). **[4 × 2 = 8]**

a) Explain types of grammar.

b) Construct FA for regular expression.

(01+10)*+11

c) Differentiate between FA and PDA (any two points).

d) Write down the ϵ-closure of each state from the following FA.

e) Define types of Turing Machine.

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

a) Construct a DFA for a language

L1∩L2

L1= { All strings starting with 'a'}

L2= { All strings not having 'ab' as substring}

b) Construct the following CFG into Normal Form (CNF)

S-> ABA

A-> aA | ϵ

B-> bB | ϵ

c) Design TM for language,

L {WCW^R|W is in $(0+1)^*$}

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

a) Construct a PDA for the language

L = {$0^n 1^m 2^{n+m}$ | n,m>=1}

b) Construct a Moore machine for the language L over Σ = {0, 1 } which outputs '*' if the string contains '11' in it and outputs '#' otherwise.

c) Compare DFA and NFA.

Q5) Attempt any ONE of the following (Out of TWO).   **[1 × 3 = 3]**

a) Construct a Mealy machine to convert each occurrence of substring 101 by 100 over alphabet {0,1}.

b) Show that L = {0^n1^n| n>=1} is not regular.

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PA-1029

[5902]-57

T.Y. B.Sc. (Semester - V)

COMPUTER SCIENCE

CS-3510 : Python Programming

(2019 Pattern) (CBCS)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

    1) *Figures to the right indicate full marks.*

    2) *All Questions are compulsory.*

    3) *Total number of questions are FIVE.*

Q1) Attempt any Eight of the following (Out of Ten). **[8 × 1 = 8]**

    a) What are the advantages of Python?

    b) List out main differences between lists & tuple.

    c) Python is a scripting language. Comment.

    d) Demonstrate set with example.

    e) What is dictionary? Give example.

    f) What is regEx? give example.

    g) What is user defined Module? Give example.

    h) Python is case sensitive language. Comment.

    i) What is dry run in Python?

    j) What is lambda function? Give example.

Q2) Attempt any four of the following (Out of Five). **[4 × 2 = 8]**

    a) Write a python program to calculate X^Y.

    b) Write a python program to accept a number and check whether it is perfect number or not.

P.T.O.

c) What is the use of seek( ) & tell ( ) functions?

d) Demonstrate list slicing.

e) A tuple is ordered collection of items. Comment.

Q3) Attempt any Two of the following (Out of Three).   **[2 × 4 = 8]**

a) Write a short note on datatypes in Python.

b) Write a short note on exception handling.

c) What is a module? What is package? Explain with example.

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

a) Write a recursive function in Python to display addition of digits in single digit.

b) Write a program in python to accept 'n' integers in a list, compute & display addition of all squares of these integers.

c) Write a Python program to count all occurences of "India" and "Country" in a text file "pledge.txt".

Q5) Attempt any One of the following (Out of Two).   **[1 × 3 = 3]**

a) What is the output of following code :

```
X = 5
def    f1( ) :
       global X
       X = 4
def    f2(a, b) :
       global X
       return a+b+X
f1( )
total = f2(1, 2)
print (total)
```

b) What is the output of following code :

```
def  f(X) :
        def    f1(a, b) :
                print ("hello")
                if (b==0) :
                    print ("NO")
                    return
                return f(a, b)
        return f1
    @ f
    def  f(a, b) :
        return a%b
    f(4, 0)
```

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[5902]-58

T.Y. B.Sc. (Semester - V)
COMPUTER SCIENCE
CS-3511 : Blockchain Technology
(2019 Pattern) (CBCS)

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 the formula to calculate transaction fee in Ethereum?

   b)   What is plain text and cipher text?

   c)   What is FPGA?

   d)   In AES, on which factor does the number of encryption rounds depend on?

   e)   What is smart contract?

   f)   What is the size of encryption key in DES?

   g)   What is ASIC?

   h)   Which algorithm is used by Bitcoin to verify transactions?

   i)   Which is a unique PoS cryptocurrency that is aimed at delivering interoperability among other blockchains?

   j)   What is DAPP?

P.T.O.

Q2) Attempt any four of the following :   **[4 × 2 = 8]**

   a)   What is the difference between public and private blockchains?

   b)   Blockchains are slow as compare to database. Justify.

   c)   What is P2P crypto Exchange?

   d)   What is BFT?

   e)   What is Hybrid Blockchain?

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

   a)   Write a short note on life cycle of smart contract.

   b)   What is Hard & Soft forks?

   c)   What is PoW?

Q4) Attempt any two of the following :   **[2 × 4 = 8]**

   a)   Write a short note on challenges of blockchain.

   b)   Write a short note on ICO.

   c)   Which are the different value data types in solidity?

Q5) Attempt any one of the following :   **[1 × 3 = 3]**

   a)   Write a short note on first Generation Blockchain.

   b)   Describe EVM with the help of neat diagram.

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PA-1031

[5902]-61

T.Y. B.Sc. (Semester - VI)
COMPUTER SCIENCE
CS-361 : Operating System - II
(2019 Pattern) (CBCS)

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 request edge?

   b)   What is safe state?

   c)   Write the names of any two disk allocation methods of disk space.

   d)   List disk performance parameters.

   e)   Define distributed system.

   f)   What is size scalability?

   g)   List the different architectural styles of distributed operating systems.

   h)   What is kernel?

   i)   What is RISC in ARM architecture?

   j)   Write any two special service requirements of mobile operating system.

P.T.O.

Q2) **Attempt any four of the following :** [4 × 2 = 8]

a) Write the difference between SCAN & LOOk disk scheduling algorithms.

b) Define seek time & rotational latency.

c) Explain features of mobile operating system.

d) Give a comparative study of any four points of Android mobile operating system and Apple i05 mobile operating system.

e) Write a short note on centralized organization of system architecture.

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

a) Explain any two deadlock prevention strategies.

b) Explain sequential access & Direct access methods for a file.

c) Write a short note on cloud computing system.

Q4) **Attempt any two of the following :** [2 × 4 = 8]

a) Consider following snapshot of the system. A, B, C, D are the resource types. Answer the following questions using Banker's algorithm.

i) What are the contents of Need matrix/array?

ii) If the system is in the safe state, give the safe sequence.

	Allocation				Max				Total			
	A	B	C	D	A	B	C	D	A	B	C	D
P_0	0	0	1	2	0	0	1	2	1	5	2	0
P_1	1	0	0	0	1	7	5	0				
P_2	1	3	5	4	2	3	5	6				
P_3	0	6	3	2	0	6	5	2				
P_4	0	0	1	4	0	6	5	6				

b) Explain any four file operations.

c) Explain the design goals of distributed systems.

Q5) **Attempt any one of the following :** [1 × 3 = 3]

a) What is total head movement for First-Come First-Served (FCFS) scheduling for the disk queue with requests for I/O to blocks on cylinders 98, 183, 37, 122, 14, 124, 65, 67 in that order, If the disk head is initially at cylinder 53.

b) Explain the special constraints & requirements of mobile operating system.

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[5902]-62

T.Y. B.Sc. (Computer Science)
CS - 362 : SOFTWARE TESTING
(2019 Pattern) (Semester - VI) (CBCS)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

1) All questions are compulsory.

2) Figures to the right indicate full marks.

3) Assume suitable data if necessary.

Q1) Attempt any 8 of the following : **[8 × 1 = 8]**

a) What is fault?

b) Define verification.

c) Define stub.

d) Write methods of white box testing.

e) Define regression testing.

f) What is Agile Methodology?

g) List dimensions of quality

h) Define strategy for web applications.

i) Define acceptance testing.

j) Black box testing is called glass box testing Justify T/F.

Q2) Attempt any four of the following : **[4 × 2 = 8]**

a) Write short note on testing roles.

b) Explain white box and black box testing.

c) Compare testing and debugging any two points.

d) Explain performance of testing.

e) Write a short note on features of Agile testing.

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

   a) Explain test case with example.

   b) Write a short note on V-model with diagram.

   c) Explain navigation testing in detail.

Q4) Attempt any two of the following :   [2 × 4 = 8]

   a) Write a short note on alpha & beta testing.

   b) Explain integration testing. What is bottom up integration.

   c) What is web application? How it works explain with diagram.

Q5) Attempt any one of the following :   [1 × 3 = 3]

   a) Explain different layers of automated tests.

   b) Write a short note on internationailization testing.

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[5902]-63

T.Y. B.Sc. (Computer Science)
CS - 363 : WEB TECHNOLOGIES - II
(2019 Pattern) (Semester - VI) (CBCS)

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) How to set response header in PHP?

b) Write any two applications of using AJAX.

c) What are XML namespaces?

d) Write the elements of global array $_SERVER.

e) Give any two limitations of JavaScript.

f) Whether root element is required for XML file? If so, how many root elements are required?

g) What is the use of iSNAN() function in Java Script?

h) What are different values of readyState property of XMLHttpRequest?

i) List out parts of XML document structure.

j) Which function is used to create cookie in PHP? Give syntax of it.

Q2) **Attempt any FOUR of the following :**   **[4 × 2 = 8]**

a) List any four datatypes that JavaScript support with its usage.

b) How to start and destroy session in PHP? Give syntax.

c) Draw AJAX web application model.

d) What is MVC?

e) What are different rules to make XML document well-formed?

P.T.O.

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

a) Explain the JavaScript confirm dialog box with suitable example.

b) Explain CodeIgniter architecture with suitable diagram.

c) What are different techniques to maintain state in PHP?

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

a) Write an AJAX program to display list of countries stored in an array on clicking OK button.

b) Design the HTML form to accept Employee name, Age and Mobile no. and perform the following validation using Java Script:

i) No field should be empty.

ii) Mobile no. must contain 10 digits

c) Suppose following books.xml is loaded into xmlDoc. Get the first <book> element and change the "category" attribute value to "food" using XML DOM.

<?xml version="1.0" encoding="UTF-8"?>

<bookstore>

    <book category="cooking">

    <title lang="en">Everyday Italian</title>

    <author>Giada De Laurentiis</author>

    <year>2005</year>

    <price>30.00</price>

    <book>

    </bookstore>

Q5) **Attempt any ONE of the following :** [1 × 3 = 3]

    a)   What is XML parser? Explain two different types of XML parsers.

    b)   Write down the steps to integrate external CSS and JS file in CodeIgniter. Give example.

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T.Y. B.Sc. (Semester - VI)
COMPUTER SCIENCE
CS-364 : Data Analytics
(2019 Pattern) (CBCS)

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 (out of 10).   **[8 × 1 = 8]**

a) Define Data Analytics.

b) What is AVC & ROC curve?

c) Write any two applications of Supervised Machine Learning.

d) Give the formula for support & confidence.

e) What is an outlier?

f) State applications of NLP.

g) What is web scraping?

h) What is the purpose of n-gram?

i) Define classification.

j) Define Recall.

Q2) Attempt any four of the following (Out of five).   **[4 × 2 = 8]**

a) Explain the concept of underfitting & overfitting.

b) What is linear Regression? What type of Machine learning applications can be solved with linear Regression?

P.T.O.

c) What is Social Media Analytics?

d) What are the advantages of FP-growth Algorithm?

e) What are dependent & independent variables?

Q3) Attempt any two of the following (Out of three). **[2 × 4 = 8]**

a) What are frequent itemsets & association rules? Describe with example.

b) What is stemming & lemmatization?

c) Explain various types of Data Analytics.

Q4) Attempt any two of the following (Out of three). **[2 × 4 = 8]**

a) What is Bag of words & DOS tagging in NLP?

b) What is Logistic Regression? Explain it with example.

c) Consider the following database & find out the frequent itemset using Apriori Algorithm with minimum support threshold = 3.

T. id.	Item purchased
1	M,T,B
2	E,T,C
3	M,E,T,C
4	E,C
5	J

Q5) Attempt any one of the following (Out of 2). **[1 × 3 = 3]**

a) Define the terms

i) Confusion Matrix

ii) Accuracy

iii) Precision

b) What is Machine Learning? Explain its type.

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[5902]-65

T.Y. B.Sc. (Semester - VI)
COMPUTER SCIENCE (Paper - V)
CS-365 : Object Oriented Programming using Java - II
(2019 Pattern) (CBCS)

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 collection?

   b) Define Thread Priority.

   c) What is jdbc?

   d) Define Session.

   e) What is use of request object?

   f) Write any one application of spring.

   g) What is use of join( ) method?

   h) Define HashTable.

   i) What is use of commit( ) method?

   j) List any two implicit object in JSP.

Q2) Attempt any four of the following.   **[4 × 2 = 8]**

   a) Write any two differences between Array List and Linked List.

   b) Give any two field of Resultset Interface.

   c) Give any two types of servlet.

P.T.O.

d) Differentiate between sleep( ) and interrupt( ).

e) Write a syntax of getcookies( ) method in servlet.

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

a) Write a jdbc program to accept details of student (RN, Name, percentage) from user. Display that details.

b) Write a java program in multithreading to display all the numbers between 1 to 10. Each number should display after 2 seconds.

c) Write a jsp script to check the given number is prime or not. Display the result in blue color.

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

a) Write a Servlet program to get information about the server such as name, port number and version of server.

b) Explain JSP lifecycle in details.

c) Explain Synchronization with an example.

Q5) Attempt any one of the following. **[1 × 3 = 3]**

a) Explain execution process of servlet application.

b) Write a java program to accept 'n' names from user store them into Array List, sort them in ascending order and display it.

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[5902]-66

T.Y. B.Sc. (Semester - VI)
COMPUTER SCIENCE
CS-366 : Compiler Construction
(2019 Pattern) (CBCS)

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 (out of Ten) :

[8 × 1 = 8]

a) YACC is a compiler or Parser. Write Correct Statement.

b) Write a regular expression in lex for hex decimal number in C language.

c) Define cross Compiler.

d) List any two transformations performed on basic block.

e) What is sentinels?

f) Define Annotated Parse Tree.

g) Name the types of LR parser.

h) What is basic block?

i) State the use of function retract ( ).

j) Construct LR(1) items for the following production.
     $S \rightarrow \in$

Q2) Attempt any four of the following :

[4 × 2 = 8]

a) List out all phases of compiler in sequence.

b) Define synthesized attribute and Inherited attribute.

P.T.O.

c) Construct a DAG for block :

   b = a[i]

   a[j] = d

   e = a[i]

d) Differentiate between top-down parsing and bottom-up parsing.

e) Define left recursion. How it can be eliminated?

Q3) Attempt any two of the following (out of three) :   **[2 × 4 = 8]**

a) Check whether the given grammar is SLR (1) or not.

   S → L = R | R

   L → * R | id

   R → L

b) Write lex program specification. Explain the Lex library functions associated with lex in brief.

c) Compute First & Follow for the following.

   S → BD | AB

   A → aAa|b

   B → bAa |∈

   D → ∈

Q4) Attempt any two of the following :   **[2 × 4 = 8]**

a) Check whether the give grammar is LALR (1) or not.

   S → aAd | bBd | aBe | bAe

   A → c

   B → c

b)   What is multi-pass compiler? Explain diagrammatically with its advantages and disadvantages.

c)   Consider the following syntax-directed definition and Draw the Annotated parse tree for the input string 5+3*4.

Production	Semantic Rule
L → En	Print E.val
E → E1+T	E.val=El.val+T.val
E → T	E.val=T.val
T → Tl * F	T.val=TI.val* F.val
T → F	T.val=F.val
F → (E)	F.val=E.val
F → digit	F.val=digit.lexval

Q5) Attempt any one of the following :   **[1 × 3 = 3]**

a)   List the code optimization techniques. Explain anyone technique with an example.

b)   Draw the operator precedence table for the following grammar :

E → E + E |E*E |E-E |id

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[5902]-67

T.Y. B.Sc. (Computer Science) (Semester - VI)
CS-3610 : Software Testing and Tools (Paper - VII)
(2019 Pattern)

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 (out of Ten) :   **[8 × 1 = 8]**

  a)   Define Test Automation.

  b)   What is test report?

  c)   What is static testing?

  d)   What is error?

  e)   Write any two software defect by nature.

  f)   Define Smoke testing.

  g)   Test suites are used to group similar test cases. State TRUE or FALSE.

  h)   What is Cyclomatic complexity?

  i)   How many types of testing tools?

  j)   Define code coverage in white box testing.

Q2) Attempt any four of the following (out of five) :   **[4 × 2 = 8]**

  a)   List the goals of loop coverage testing.

  b)   Define test criteria and explain its types.

  c)   List any two web based open source automation software testing tools.

  d)   Define priority defect and its different levels.

  e)   Write any two features of Bugzilla tool.

P.T.O.

Q3) Attempt any two of the following (out of three) : **[2 × 4 = 8]**

   a) What are different types of loop testing? Explain in details.

   b) Explain IEEE Std.Test Incident report in details.

   c) Develop source code to check if number is prime or not in C Programming lang.

      i) Draw the control flow graph.

      ii) Calculate Cyclomatic complexity for all methods.

      iii) List all independent path test cases for independent paths.

Q4) Attempt any two of the following (out of Three) : **[2 × 4 = 8]**

   a) Create case study for verify the functionality of amazon login page.

   b) Consider following code and apply decision coverage testing create use cases

      Check-class(int x)

         {

            If(x>80)

               Print("O")

            else

               Print("Class A")

         }

         Test case 1: x >80 and Test case 2: x <80

   c) Explain STLC with its phases.

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

   a) Write short note on Classification of Defects.

   b) Give any three features of winRunner and selenium.

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

CS - 212 : RELATIONAL DATABASE MANAGEMENT SYSTEMS

(2013 Pattern) (Semester - I) (Paper - II) (21122)

Time : 2 Hours] *[Max. Marks : 40*

Instructions to the candidates :
  1) *All questions are compulsory.*
  2) *All questions carry equal marks.*
  3) *Figures to the right indicate full marks.*

Q1) Attempt all of the following : **[10 × 1 = 10]**

  a) What are the undesirable properties of a Bad database design?

  b) Define Decomposition.

  c) What is System Throughput?

  d) Define Deadlock.

  e) What is Referential Integrity?

  f) Write the names of two techniques for using log to achieve the recovery.

  g) Define force writing.

  h) Define Server.

  i) Define Fat client.

  j) What is a trigger?

Q2) Attempt any Two of the following : **[2 × 5 = 10]**

  a) Explain statistical database security.

  b) How client machine interact with server? Explain with diagram.

  c) Define a Transaction. Explain its properties.

P.T.O.

Q3) Attempt any Two of the following : [2 × 5 = 10]

a) The following is a list of representing the sequence of events in an interleaved execution of set T_1, T_2, T_3 and T_4 assuming 2PL protocol. Construct a wait for graph according to request. Is there a deadlock at any instance. Justify.

Time	Transaction	Code
t_1	T_1	Lock (A, X)
t_2	T_2	Lock (C, S)
t_3	T_3	Lock (A, S)
t_4	T_4	Lock (C, S)
t_5	T_1	Lock (B, X)
t_6	T_2	Lock (B, S)
t_7	T_3	Lock (D, S)
t_8	T_4	Lock (D, X)

b) Consider the following entities & their relationships. Employee (eno, ename, sex, Joining date, designation, salary, dno)

Dept (dno, dname)

Write a PL/PgSQL block to list the names of all employees, who are female and are earning the maximum salary in their department.

c) State and explain Thomas write rule with suitable example.

Q4) Attempt the following : [2 × 5 = 10]

a) Following are the entries at the time of system crash.

[Start, Transaction, T_1]

[Write-item, T_1, A, 10, 100]

[Commit, T_1]

[Check point]

[Start-Transaction, T_2]

[Write-item, T_2, B, 20, 200]

[Commit, T_2]

[Start-Transaction, T_3]

[Write-item, T_3, C, 30, 300] ← system crash.

If immediate update technique with check point is used, what will be recovery procedure?

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b) What is view? Explain different statements in views.

<div align="center">OR</div>

Explain following PL/PgSQL statements with syntax and example.

i) While loop.

ii) For loop.

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

CS - 221 : OBJECT ORIENTED CONCEPTS USING C++

(2013 Pattern) (Semester - II) (22121) (Paper - I)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:

   1)   All questions are compulsory.

   2)   All questions carry equal marks.

   3)   Assume suitable data if necessary.

   4)   Figures to the right indicate full marks.

Q1) Attempt all of the following: **[10×1=10]**

   a)   What are the basic concepts of OOP?

   b)   How many arguments must be passed to overload a binary operator using non-member function?

   c)   List the operator which can be overloaded only using friend function.

   d)   Differentiate between ios::app and ios::out.

   e)   Explain any two access specifiers.

   f)   Give the syntax to create an object of template class.

   g)   What is an Exception?

   h)   Which header file is used for manipulators?

   i)   How can a comment be written in a c++?

   j)   What is abstract class?

Q2) Attempt any two of the following: **[2×5=10]**

   a)   What is copy constructor? What is its purpose? Explain with example.

   b)   Write a C++ program to accept the eno, ename, esalary and ebonus for five employees. Calculate total salary and display the output.

   c)   Explain various file stream classes needed for file manipulation.

Q3) Attempt any two of the following: **[2×5=10]**

a) Write a C++ program to display the contents of a text file in reverse order. (Use pointer manipulation).

b) What is function template? Explain overloading of tempelate function.

c) Explain multiple and multilevel Inheritance with suitable example.

Q4) Attempt any One of the following (a or b): **[1×10=10]**

a) i) Explain how run time polymorphism is achieved in C++. Explain with example. **[5]**

ii) What is the output of the following program? (Assume there are no syntax errors): **[3]**

```
#include <iostream.h>
void foot( )
{
int m = 10;
static int n = 10;
++m;
n++;
cout<<m<<" "<<n<<"\n";
}
int main( )
{
foo( );
foo( );
return 0;
}
```

iii) What is the use of tellg( ) and tellp( )? **[2]**

OR

b) i) Write a C++ program to add two complex number using operator overloading. (Use member function) **[5]**

ii) Explain the three keywords used for exception handling. **[3]**

iii) Explain any two uses of scope resolution operator with suitable example. **[2]**

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