[Total No. of Questions: 3]          [ Total No. of Pages: 2]     Exam Seat No :

Anekant Education Society's

# Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati.
## (Empowered Autonomous)
### Affiliated to Savitribai Phule Pune University , Pune
### S.Y. B. Sc. (Computer Science) – Sem III
### COS-201-MJM  Basic Data Structures (Paper – I)
### (NEP Pattern)

[Time: One Hour]          [No. of Credits 02]          [Max Marks: 30]

**Instructions to the Candidates:**

1) All questions are compulsory
2) Write programs wherever necessary.
3) Figures to the right indicate full marks.

**Q. 1. (A)  Attempt EACH of the following.**          [1 Marks Each]

1. Define Data Structure.          [1]

2. Define Space Complexity.          [1]

3. Define the term Bib O notation.          [1]

4. Which strategy is used to sort data using merge sort?          [1]

**(B)  Attempt EACH of the following.**          [2 Marks Each]

1. Calculate the address of element A[2][2] in int array A[3][4] in the row major representation. (Assume base address = 1000).          [2]

2  Write the node class for a singly linked list.          [2]

3. Write any two applications of stack in computer and in real life.          [2]

**Q. 2. Attempt any FOUR of the following.**          [3 Marks Each]

1. Differentiate between array and linked list.          [3]

2. Sort the following elements using Bubble Sort. (Write all Passes):
   92  21  41  71  51  31  81          [3]

3. Write a function to search given number using linear search.          [3]

4. Show to stack content after each step : (Consider Stack of characters )          [3]
   a) Push('A')
   b) Push('B)
   c) Push('C')
   d) Pop()
   e) Pop()
   f) Push('B')
   g) Pop()

5. Convert the following expressions to postfix by showing the stack contents :     [3]

   ((A + B) – (C-D))/(F+G)

6. Write a function to create 'n' node in a singly linked list.                     [3]

## Q.3. Attempt any TWO of the following.          [4 Marks Each]

1. Show all the steps of sorting the following data using quick sort :
   24   30   27   32   11   21   19                                                 [4]

2. Write functions to Create, Push , Pop , isEmpty , isFull  for stack using static
   implementation.                                                                  [4]

3. Write a function to reverse a singly linked list.                                [4]

4. Write algorithm for binary search. Also state its worst case time complexity.   [4]

-------Best of Luck--------

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# Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati.
## (Empowered Autonomous)
### Affiliated to Savitribai Phule Pune University , Pune
### S.Y. B. Sc. (Computer Science) – Sem III
### COS-203-MJM Software Engineering Principles and Techniques
### (NEP Pattern)

[Time: One Hour]          [No. of Credits 02]          [Max Marks: 30]

**Instructions to the Candidates:**

1) All questions are compulsory
2) Write programs wherever necessary.
3) Figures to the right indicate full marks.

**Q. 1. (A) Attempt EACH of the following.**                    [1 Marks Each]

1. Define System.                                                          [1]

2. What is Risk Analysis?                                                  [1]

3. What is Physical DFD?                                                   [1]

4. Define Software Testing.                                               [1]

**(B) Attempt EACH of the following.**                         [2 Marks Each]

1. What is Closed System? Give Example.                                   [2]

2. Enlist the Characteristics of software. .                              [2]

3. What is Legacy Software? Give Example.                                 [2]

**Q. 2. Attempt any FOUR of the following.**                    [3 Marks Each]

1. Differentiate between MIS and DSS system.                             [3]

2. Write the advantages and disadvantages of Incremental Process Model.  [3]

3. Differentiate between Structure and Unstructured Interview.           [3]

4. Explain any 3 core principles of software engineering.                [3]

5. What is feasibility study? Explain its types. [3]

6. Explain spiral model in detail. [3]

**Q.3. Attempt any TWO of the following.** [4 Marks Each]

1. Explain any three fact finding techniques. [4]

2. Explain waterfall model with diagram. [4]

3. Draw Context level diagram (DFD) and 1$^{st}$ level DFD of Hospital Management System. [4]

4. Draw Context level diagram (DFD) and 1$^{st}$ level DFD of Library Management System. [4]

———*Best of Luck*———

[3]

[3]

ach]

[4]

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**Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati**
**(Autonomous)**
**Affiliated to Savitribai Phule Pune University, Pune**

**S.Y. B.Sc. (Comp. Sci.) Electronics**
**COS-211-MN(C): Digital Logic Design**
**Semester- III**
**(2023 Pattern)**

Time: One Hour                 (No. of Credits 02)                 Max. Marks : 30

**Instructions to the candidate:**

i.    All questions are compulsory.
ii.   Neat labeled diagrams must be drawn whenever necessary.
iii.  Use of calculator is allowed.
iv.   Figures to the right indicates full marks.

___

Q.1. (A) Attempt **each** of the following                         (1 Marks each)
    i) What is demultiplexer?
    ii) Draw the truth table of RS flip-flop.
    iii) Give two advantages of using fixed function ICs.
    iv) Define decoder.
    (B) Attempt **each** of the following                          (2 Marks each)
    i) Define combinational circuit? Enlist names of combinational circuits.
    ii) What is synchronous counter? Give types of counter.
    iii) Give any four advantages of PLD.

Q.2    Attempt any **four** of the following                        (3 Marks each)
    i) Explain full adder in detail.
    ii) Give truth table and explain SR flip-flop in detail.
    iii) Write a note on programmable logic device.
    iv) Design 1:4 demultiplexer with its expression.
    v) Explain 3-bit down counter.
    vi) What is CPLD? Draw the block diagram of CPLD.

Q.3.   Attempt any **two** of the following                         (4 Marks each)
    i) Design 4-bit up counter with its state diagram and truth table.
    ii) Explain ring counter in detail.
    iii) What is programmable logic array. Explain PLA in detail.
    iv) What is encoder? Explain priority encoder in detail.

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## Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati.
### (Empowered Autonomous)
### Affiliated to Savitribai Phule Pune University , Pune
### S.Y. B. Sc. (Computer Science) – Sem III
### COS-221-VSC : Programming in C++
### (NEP Pattern)

[Time: One Hour]          [No. of Credits 02]          [Max Marks: 30]

**Instructions to the Candidates:**

1) All questions are compulsory
2) Write programs wherever necessary.
3) Figures to the right indicate full marks.

**Q. 1. (A) Attempt EACH of the following.**                     [1 Marks Each]

1. What is file.                                                  [1]
2. What is an abstract class ?                                    [1]
3. Class members are public by default. Justify (T/F)            [1]
4. Define Object.                                                 [1]

**(B) Attempt EACH of the following.**                          [2 Marks Each]

1. What is inline function.                                       [2]
2. Define polymorphism.                                           [2]
3. List the types of Inheritance.                                [2]

**Q. 2. Attempt any FOUR of the following.**                    [3 Marks Each]

1. Explain the get() and put() function with syntax and example.  [3]
2. Write basic concept of object oriented programming in brief.   [3]
3. Explain the c++ stream classes.                                [3]
4. What is access specifier? Explain the following access specifiers with example.   [3]

        a.     Public
        b.    Protected.

5. What will be the output of the following c++ statement ?       [3]

```
                    cout.precision(2);
                    cout.width(6);
                    cout<<7.1234;
```

6. Trace the output of following Program :

```cpp
#include<iostream.h>
using namespace std;
Class X
{
    public:
    X( )
    {
        , cout<<"Default cntr\n";
    }
    X( const X &)
    {
        cout<<"Copy Constructor\n";
    }
};
X  UserCode(X b)
{
    X c=b;
    return C;
}
main()
{
    X a;
    cout<<"calling Usercode() \n";
    X d=UserCode(a);
    cout<<"back in main()\n";
}
```

## Q.3. Attempt any TWO of the following.

1. Write a c++ Program to copy the content of two binary files into a third file.

**[4 Marks Each]**

2. What is manipulators? Explain any two manipulators with example.  [4]

3. What is inheritance? Explain Multilevel Inheritance  [4]

4. Create a c++ class for a student object with the following attributes-roll number, name, number of subjects, Marks of subjects. The number of subjects vary for each student . write a parameterized constructor which initializes roll number, name and number of subjects, Marks of subjects. The number of subjects vary for name and number of subject  and creates the array  for marks dynamically. Also write appropriate accept and Display Functions.

[4]

———Best of Luck———

[3]

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# Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati

### (Empowered Autonomous)

#### Affiliated to Savitribai Phule Pune University, Pune

## S.Y.B.Sc. (Computer Science) (Semester IV)

## COS-252-MJM: Advanced Web Technology

## (NEP 1.O 2023 Pattern)

[ **Time : One Hour**]          [**No. of Credits : 02**]          [ **Max Marks** : 30]

--------------------------------------------------------------------------------------------------

_**Instructions to the candidates:**_
  i.    _All questions are compulsory._
  ii.   _Neat, labeled diagrams must be drawn wherever necessary._
  iii.  _Figures to the right indicate full marks._

**Q.1 (A)   Attempt <u>each</u> of the following**                                        (1 Mark each)

  (i)     What is the purpose of the <meter> element in HTML5?

  (ii)    What are the four parts of the CSS Box Model?

  (iii)   Name two primitive data types in JavaScript

  (iv)    What are the two types of containers in Bootstrap?

**(B)   Attempt <u>each</u> of the following:**                                        (2 Mark each)

  (i)     Write the syntax for creating a simple SVG circle

  (ii)    Explain the difference between serif and sans-serif fonts.

  (iii)   Explain the purpose of including JavaScript in a web page.

**Q.2 Attempt <u>any four</u> of the following**                                        (3 Marks each)

  (i)     Write a brief explanation of Bootstrap's grid system and its importance in responsive design.

  (ii)    Write a JavaScript program to print Fibonacci series of 10 terms.

  (iii)   Explain in detail HTML<audio> element.

(iv) Write an HTML example to demonstrate a simple image map with clickable areas

(v) Explain the different kinds of "Data Types" available in JavaScript.

(vi) Explain the use of animation-iteration-count and animation-direction with examples

## Q.3 Attempt <u>any two</u> of the following

**(4 Marks each)**

(i) Write a program to display a confirm popup box asking, "Are you sure you want to proceed?" and log the user's response in the console.

(ii) State difference between HTML Canvas and HTML SVG.

(iii) Write a JavaScript program that uses a function to find the factorial of a number.

(iv) Explain following properties with example.
   a. font-variant
   b. animation-direction

--------------------------------------------- Best of Luck ----------------------------------------------

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**Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati.**
( Autonomous)
**Affiliated to Savitribai Phule Pune University, Pune.**
**S.Y.B.Sc. (Computer Science)**
**Statistics**
**Semester IV**
**COS-261-MN (A): Continuous Probability Distributions and Testing of Hypothesis**
**(2023 Pattern)**

Time Allowed: One Hour]          (No.of Credits 02)          [Max Marks: 30

**Instructions:**
i)  All questions are compulsory.
ii) Figures to the right indicate full marks.
iii)Use of scientific calculator and statistical table is allowed.
iv) Symbols and abbreviations have their usual meaning.

**Q.1) A) Choose the correct alternative of the following:**                                    (1each)

i)  Null and alternative hypotheses are statements about:

a) population parameters

b) sample parameters

c) sample statistics

d) it depends sometimes population parameters and sometimes sample statistics

ii)  The mean of continuous uniform distribution with parameters a and b is

a) $a - b$          b) $\frac{a+b}{2}$          c) $\frac{b-a}{2}$          d) $a + b$

iii)  Which one of the following non- parametric tests is applicable for a randomness of sample?

a) Median test          b) Sign test          c) K-S test          d) Run test.

iv)  Level of significance is the probability of

a) type I error                    b) type II error

c) type I and type II errors both          d) P-value

**B) Answer each of the following:**                                    (2each)

i)  Define normal distribution and state its mean and variance.

ii) Discuss the application of uniform distribution.

iii) Define test statistic

**P.T.O.**

**Q.2) Attempt any four of the following:**

(3 each

Tot

i) A wholesaler in apples claims that only 6% of the apples supplied by him are defective. A random sample of 500 apples contained 26 defective apples. Test the claim of the wholesaler. (Use 5 % l.o.s)

ii) Define exponential distribution and give any two real life situations.

iii) Describe the test procedure for testing equality of two population variance.

iv) Let X~ N ($\mu = 6$, $\sigma^2 = 9$). Find P(X > 3), P ($12 \leq X \leq 15$).

v) Explain paired t test along with the assumption made.

vi) 20 mangoes were inspected and were labelled as accepted for export (A) and rejected for export (R) :

R A A A R R R A A A A A R A R A A R A A.

Use run test at 5% level of significance to decide whether the sequence of accepted and rejected mangoes is random.

**Q.3) Attempt any two of the following:**

(4 each)

i) A survey of 600 peoples was conducted to investigate whether alcohol drinking and smoking habit are independent. The results are as follows:

| | Smoker | Non-Smoker |
|---|---|---|
| Drinker | 193 | 165 |
| Non-Drinker | 89 | 153 |

Examine whether the alcohol drinking and smoking habit are independent. Use 5% level of significance. (Given: $\chi^2_{1,0.05} = 3.841$)

ii) Define the following terms:-

      a) Type I error          b) Standard error          c) p-value

iii) Explain the procedure of testing hypothesis $H_0: \mu = \mu_0$ against alternative $H_1: \mu \neq \mu_0$ for a large sample.

vii) Daily sales figures of 50 shopkeepers showed that their average sales and standard deviation where Rs.428 and Rs.600 respectively. Can we conclude daily sale on an average is greater than 400? (Use 5 % l.o.s.)

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Total No. of Questions: 03

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**Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati.**
(Autonomous)

Affiliated to Savitribai Phule Pune University, Pune.

**S.Y. B.Sc.(Computer Science)**
**MATHEMATICS**
Semester – IV

**COS-261-MN(B): Numerical Analysis**
(2023 Pattern)

Max. Marks: 30

Time: 1 Hours
Instructions to the Candidates:
1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of non-programmable scientific calculator is allowed.

[04]

**Q1) A)** Attempt the following. (*1 mark each*)
a) Define averaging operator.
b) Write formula for Runge-Kutta forth order method.
c) Write significant digit of the number 0.01234 .
d) Define Percentage error.

[06]

**B)** Attempt the following. (*2 mark each*)
a) Prove that $\nabla = \Delta E^{-1}$.
b) Which of the following numbers has the greatest precision and accuracy.
   5.1 and 5.4302
c) If $y = \sec^2 x$ then find the error in $x$.

[12]

**Q2)** Attempt any **FOUR** of the following. (*3 mark each*)
a) If true value of 0.7452 is 0.745250. Find absolute error, relative error, percentage error.
b) Find the approximate root of the equation $x^4 - x - 10 = 0$ by using Newton- Raphson method .(Perform three iteration).
c) Construct a forward difference table from the following data.

| x | 1 | 3 | 5 | 7 | 9 |
|---|---|---|---|---|---|
| y | 2 | 10 | 26 | 50 | 82 |

d) Use Simpson's rule to evaluate $\int_0^1 \frac{1}{x} dx$ (Take $h = 0.5$).

e) Use Euler's method to compute $y(0.2)$. Given that $\frac{dy}{dx} = -y$ with $y(0) = 1$.
   (Take $h = 0.1$)

*P.T.O*

*f)* Use Runge-Kutta Second order formula to find $y(0.2)$. Given that $\frac{dy}{dx} = 1 + y^2$, $y(0) = 0, h = 0.2$.

**Q3)** Attempt any **_TWO_** of the following. (*4 mark each*)

[08]

*a)* Estimate the missing term in the following table.

| $x$ | 1 | 2 | 3 | 4 | 5 |
|-----|---|---|----|----|----|
| $u_x$ | 7 | ? | 13 | 21 | 37 |

*b)* By using Newton's forward difference formula calculate $f(3.5)$ using following data.

| $x$ | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|-----|----|----|----|-----|-----|-----|-----|-----|
| $y$ | 19 | 48 | 99 | 178 | 291 | 444 | 643 | 894 |

*c)* Round off the number 2.37421 and 38.046235 correct to four significant figures.

*d)* Use Runge-Kutta fourth order method to solve $\frac{dy}{dx} = xy^{1/3}$ where $y(0) = 1$. Obtain $y(1)$ (*Take $h = 1$*).

♦ ♦ ♦

Total No. of Questions: 3

Anekant Education Society's
Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati
(Autonomous)
Affiliated to Savitribai Phule Pune University, Pune

S.Y. B.Sc. (Comp. Sci.)    Electronics
COS-261-MN(C): Analog Electornics
Semester- IV
(2024 Pattern)

(No. of Credits 02)                                          Max. Marks : 30

Time: One Hour

Instructions to the candidate:

All questions are compulsory.
Neat labeled diagrams must be drawn whenever necessary.
Use of calculator is allowed.
Figures to the right indicates full marks.

                                                                    (1 Marks each)

(A) Attempt **each** of the following
i) Define transducer.
ii) Draw the circuit diagram of non-inverting amplifier.
iii) What is filter?
iv) How many op-amp required for 3-bit flash ADC?                    (2 Marks each)

(B) Attempt **each** of the following
i) Give working principle of LDR.
ii) Calculate gain of inverting amplifier having $R_{in}$ = 10KΩ and $R_f$= 100KΩ.
iii) Enlist any four specifications of DAC.
                                                                    (3 Marks each)

Q.2.   Attempt any **four** of the following
i) Write a note on LM-35.
ii) With an example define active and passive sensor.
iii) Describe balancing condition of Wheatstone's bridge.
iv) Explain how op-amp work as level shifter?
v) Write a note on sigma-delta ADC.
vi) Enlist three applications of ADC and DAC.
                                                                    (4 Marks each)

Q.3.   Attempt any **two** of the following
i) Explain any four specifications of sensor in detail.
ii) With neat diagram explain how op-amp works as subtractor.
iii) Write a note on dual slope ADC.
iv) Define:  a) Analog system    b) Amplifier    c) Cut-off frequency    d) Semsitivity

1

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# Tuljaram Chaturchand  College of Arts, Science and Commerce, Baramati

## (Empowered Autonomous)

### Affiliated to Savitribai  Phule, Pune University

Class- S..Y. B.A.,B.COM.,B.Sc.,B.Sc.(CS) , B.B.A. (CA), B.Voc.

MARATHI (मराठी)  (Semester-IV)

Sub Code – MAR- 281-AEC- लेखन निर्मिती व परीक्षण कौशल्ये

(NEP 2023 Pattern)

(No. of Credits 2)

Max Marks : 30

Time : 1. Hours

सूचना- १) सर्व प्रश्न सोडविणे आवश्यक आहे.

२) उजवीकडील अंक प्रश्नांचे पूर्ण गुण दर्शवितात.                    (४)

प्र.१ला. खालील प्रश्न सोडवा.

अ) खालील प्रश्नांची उत्तरे एका वाक्यात लिहा.

१. मराठी नाटकाचे जनक कोणास म्हटले जाते?

२. गंथपरीक्षणाची  व्याख्या  लिहा .

३. 'एकच प्याला', हे नाटक  कोणी  लिहिले?

४. कल्पनारम्य  निबंधाचा कोणताही एक विषय सांगा.                    (६)

ग) खालील प्रश्नांची उत्तरे २० शब्दांत लिहा.

१. नाटकाचा प्राण कशास म्हटले जाते ?

२. ग्रंथपरीक्षणाची कोणतेही दोन माध्यमे लिहा.

३. नाटकाची संहिता कशास म्हटले जाते ?                    (१२)

प्र.२रा. खालील प्रश्नांची उत्तरे ५० शब्दांत लिहा. (कोणतेही चार)

१. प्रायोगिक नाटकाविषयी माहिती लिहा.

२. 'संविधानक', याविषयी टीप लिहा.

३. नाटकाची संहिता कशास म्हटले जाते ?

४. निबंधलेखनाची वैशिष्ट्ये स्पष्ट करा.

५.  नाटकाचे स्वरूप स्पष्ट करा.

६. ग्रंथपरीक्षकाचे  गुण लिहा .                    (८)

प्र.३रा. खालील प्रश्नांची उत्तरे १५० शब्दांत लिहा. (कोणतेही  दोन)

१. ग्रंथपरीक्षणासाठी आवश्यक असणारी कौशल्ये सविस्तर स्पष्ट करा .

२. तुम्ही वाचलेल्या कोणत्याही एका नाटकाचे परीक्षण लिहा.

3. पुढीलपैकी कोणत्याही एका विषयावर निबंध लिहा.

१. प्रसारमाध्यमे आणि  युवापिढी   २. मी झाड असते तर ...?

४. तुम्ही वाचलेल्या कोणत्याही एका ग्रंथाचे परीक्षण लिहा.

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Anekant Education Society's

**Tuljaram Chaturchand College, Baramati,(Arts, Commerce & Science)**

**(Autonomous)**

Seat No. :

Total No. of Questions : 03

Total No. of Pages : 02

**(S.Y.B.A./B.Com./B.Sc./B.C.A./B.C.S./B.B.A.)**

**(SEM -IV)**

**Subject Code & Name: [HIN-281-AEC] हिंदी भाषा : संप्रेषण कौशल**

**[NEP-2020] (2023 Pattern)**

| No.of Credits 02 | अंक :30 |
|---|---|

समय : 1 घंटा

सूचनाएँ: 1) एक सभी प्रश्न अनिवार्य हैं।

2) दाहिनी ओर लिखे अंक प्रश्न के पूर्णांक हैं।

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**प्रश्न-1 अ)** निम्नलिखित बहुविकल्पीय प्रश्नों के उत्तर लिखिए। (04)

1) 'श्रवण' शब्द संस्कृत के ....... धातु से बना है।

    1) श्राव्य      2) श्रु      3) श्रवण      4) सृजन

2) अपने भावों एवं विचारों को स्पष्टतापूर्वक भाषा द्वारा अभिव्यक्त करना ही ....... कौशल है।

    1) वाचन कौशल      2) लेखन कौशल      3) श्रवण कौशल      4) भाषण कौशल

3) श्रवण और भाषण यह ...... के रूप हैं।

    1) संप्रेषण कौशल      2) सृजन कौशल      3) वाचन कौशल      4) लेखन कौशल

4) श्रवण में ....... महत्वपूर्ण है।

    1) ध्यानपूर्वक सुनना      2) विषय ज्ञान      3) उच्चारण      4) इनमें से सभी

**आ)** निम्नलिखित प्रश्नों के संक्षेप में उत्तर लिखिए। (06)

1) भाषिक कौशल के प्रकार कौन - कौन से हैं?

2) श्रवण कौशल का अर्थ स्पष्ट करते हुए उसकी कोई भी एक परिभाषा लिखिए।

3) संप्रेषण कौशल से क्या तात्पर्य है?

(P.T.O.)

प्रश्न-2) निम्नलिखित प्रश्नों में से <u>किन्ही चार प्रश्नों</u> के 50-60 शब्दों में उत्तर लिखिए।    (12)

1) श्रवण कौशल का महत्व लिखिए।

2) भाषण कौशल का स्वरुप स्पष्ट कीजिए।

3) श्रवण कौशल के उद्देश्य को स्पष्ट कीजिए।

4) भाषण कौशल की विशेषताएं स्पष्ट कीजिए।

5) श्रवण में बाधाएँ उत्पन्न करनेवाले घटक कौन से हैं?

6) भाषण कौशल में कौन - कौन सी बातें महत्वपूर्ण हैं?


प्रश्न-3) निम्नलिखित प्रश्नों में से <u>किन्ही दो प्रश्नों</u> के 80-120 शब्दों में उत्तर लिखिए।    (08)

1) श्रवण कौशल की विशेषताएं स्पष्ट कीजिए।

2) भाषण कौशल में सुधार कैसे करें?

3) श्रवण कौशल के गुण बताइए।

4) व्यक्तिमत्व विकास में भाषिक कौशलों का महत्व स्पष्ट कीजिए।


\*\*\*\*\*\*

Anekant Education Society's

Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati. (Empowered Autonomous)

S.Y.B.Sc. (Computer Science) Sem – III

UCSCO231 : Data Structure Using C

(New) (2022 Pattern) Paper-I

(No. Of Credits 03)  [Max Marks: 60]

[Time: 2 Hrs]

**Instructions to the Candidates:**

1. *All questions are compulsory*
2. *Write programs wherever necessary.*
3. *Figures to the right indicate full marks.*  **[1 mark each]**

**Q. 1. (A) Attempt EACH of the following.**  [1]

(i) Define Data Type.  [1]

(ii) Define the term Bib O notation.  [1]

(iii) Define Stable Sorting Method.  [1]

(iv) Define double ended Queue / Dequeue.  **[2 marks each]**

**(B) Attempt EACH of the following.**

(i) Calculate the address of element A[2][3] in a character array A[3][4] in the column major representation. (Assume base address = 100)  [2]

(ii) Give the best case and worst case complexity of quick sort.  [2]

(iii) Write node structure of doubly linked list.  [2]

(iv) List any two applications of queue in real life.  [2]

**Q. 2. Answer any THREE questions.**  **[3 x 4 M = 12]**

1. Write short note on time complexity. Give suitable example.  [4]

2. Show all the steps of sorting the following data using quick sort :  [4]
   24  30  27  32  11  21  19

3. Write algorithm for binary search. Also state its worst case time complexity.  [4]

4. Convert the following expressions to postfix by showing the stack contents:  [4]
   (A + B – C)+(D * (E + F) /G)

## Q.3. Answer any TWO questions.

[2 x 6 M = 12]

1. Write a 'C' function to add & delete element from Linear Queue. (Use Static Implementation).

2. Write C functions create, isEmpty, isFull, push , pop and main  for stack using static implementation.

[6]

3. Write a function to insert a node in a doubly linked list at a given position.

[6]

[6]

## Q. 4. Answer any TWO questions.

[2 x 6 M = 12]

1. Construct an AVL tree for the data:
   **COMP, MATH, STAT, GEOG, ELEC, CHEM**

2. Sort the following data using heap sort method: **10, 34, 8, 2, 40, 60, 25, 5, 50**

[6]

3. Consider the following Graph:

[6]
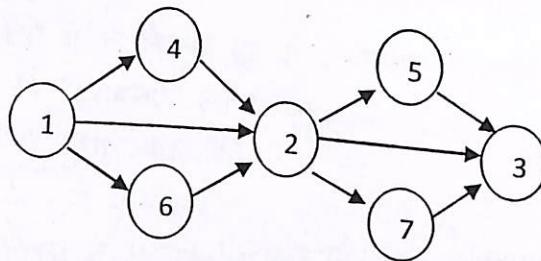


Write:  i) Draw the Adjacency list   ii) DFS and BFS traversal
   iii) Which vertices have maximum indegree.

[6]

## Q.5. Answer any ONE questions.

1. Explain the different applications in computer or real life applications where data structure might be used. (Explain at least 12 applications)

[12]

[12]

### OR

2.

   a)  If the file contains multiple occurrences of a given element, linear search will give the   position of the first occurrence. Write a function for linear search to get the last occurrence   of given element?

   [06]

   b) Generate a stack library with five operations (create, isempty, isfull, push, pop) available to implement the operation that  deletes the bottom (not the top) element of the stack?

   [06]

**Anekant Education Society's**

**Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati**

(Empowered Autonomous)

**S.Y.B.Sc. (Computer Science) (Semester IV)**

**UCSCO 242 : Software Engineering Principles and Techniques**

**(2022 Pattern)**

[No. of Credits : 03]    [ Max Marks : 60]

[ Time : 2.00 Hrs]

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**Instructions to the candidates:**

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

**(1 Marks each)**

**Q. 1 (A) Attempt each of the following**

   (i)    What is logical DFD?
   (ii)   What are the Maintenance characteristics of Good Software?
   (iii)  What is the Requirement Engineering?
   (iv)   What is stakeholder?

**(2 Marks each)**

**(B) Attempt each of the following**

   (i)    What is a generic process model?
   (ii)   What is Legacy Software? Give proper example.
   (iii)  Define Agility.
   (iv)   Define Ensure.

**(4 Marks each)**

**Q. 2 Attempt any three of the following**

   (i)    Design a prototype of Input Screen for entering student's information in Library Management System.
   (ii)   Write a note on Observation fact finding technique.
   (iii)  What is the essence (fundamentals) of Software Engineering Practice listed by George Polya?
   (iv)   What is the need of Software Development Life Cycle (SDLC)?

**(6 Marks each)**

**Q. 3 Attempt any two of the following**

   (i)    Write a note on Software Process Model.

(ii) What is feasibility study? Explain different types of it.

(iii) Draw Context level diagram (DFD) of Online Food Ordering System.

## Q. 4 Attempt <u>any two</u> of the following

(6 Marks each)

(i) Explain all the factors in requirement validation checklist?

(ii) Explain Spiral model in detail with the help of diagram.

(iii) Write a note on System Testing.

## Q. 5 Attempt <u>any one</u> of the following. [ A OR B ]

(12 Marks each)

**A.**

(i) What is Software Maintenance? Explain different types of software maintenance.

(ii) Explain waterfall model with the help of diagram.

### OR

**B.**

(i) Explain all the different characteristics of the system.

(ii) Explain Economical feasibility in detail.

--------------------------------------------------- *All The Best* -------------------------------------------------

Total No. of Questions: 05

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**Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati.**
(Autonomous)
Affiliated to SavitribaiPhule Pune University, Pune.
**S.Y. B.Sc.(Comp. Science)**
**MATHEMATICS**
Semester – IV
UCSMT241:*Computational Geometry*
(2022 Pattern)

*Max. Marks: 50*

*Time: 2 Hours*
*Instructions to the Candidates:*
1) *All questions are compulsory.*
2) *Figures to the right indicate full marks.*
3) *Use of Non-programmable scientific calculator is allowed.*

**Q1)** (A) Attempt **each** of the following. (*1 mark each*) [04]
a) Write translation matrix in three dimensional transformations.
b) If $[T] = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ and $p = [2 \ 1]$ then find $P^*$.
c) Write the transformation matrix for reflection through x-axis.
d) Define the term: control points.

(B) Attempt **each** of the following. (*2 mark each*) [08]
a) What is parametric equation of circle?
b) Determine foreshortening factors $f_x$ and $f_y$ of matrix,

$$[T] = \begin{bmatrix} 0.99 & 0 & 0 & 0 \\ -0.09 & -0.66 & 0 & 0 \\ 0.08 & -0.74 & 0 & 0 \\ -2.5 & 3.05 & 0 & 1 \end{bmatrix}.$$

c) State True/ False. Justify your answer.
Line $2x - y - 3 = 0$ is transformed using $[T] = \begin{bmatrix} 2 & -1 \\ 3 & 4 \end{bmatrix}$ then slope of transformed line is $\frac{7}{8}$.
d) Write the parametric equation of Bezier curve with control points $B_0, B_1, B_2, B_3$.

**Q2)** Attempt any **THREE** of the following. (*4 mark each*) [12]
a) Find the cabinet and cavalier projection of the object represented by the following Position vector matrix with a horizontal inclination angle $\alpha = 25°$

$$X = \begin{bmatrix} 1 & 2 & 1 \\ 3 & 4 & -1 \\ -1 & -2 & 1 \\ 2 & 1 & 1 \end{bmatrix}.$$

b) Find the concatenated transformation matrix for the following sequence of transformations in order,

   i.    Translate in x , y , z direction by -2 , -2 , -2 units resp.

   ii.   Rotate about x-axis by an angle 45°.

c) Find the parametric equation of a Bezier curve determined by control points, $B_0[0\ 2], B_1[2\ 3], B_2[3\ 2\ ], B_3[2\ 0]$. Also position vectors of the points on the curve corresponding to parameter value at $t = 0.2$.

d) Define foreshortening factors. Determine the foreshortening factors $f_x, f_y, f_z$ If the transformation matrix for axonometric projection is ,

$$[T] = \begin{bmatrix} 0.5 & 0.43 & 0 & 0 \\ 0 & 0.7 & 0 & 0 \\ 0.3 & 0.4 & 0 & 0 \\ 1 & 1 & 0 & 1 \end{bmatrix}.$$

**Q3)** Attempt any **TWO** of the following. (*6 mark each*)

                                                                        [12]

a) Find midpoint of transformed line segment of segment $AB$ with equation $3x - 2y = 5$ where $A$ and $B$ are $x, y$ intercepts and the transformation matrix is $[T] = \begin{bmatrix} 2 & -1 \\ 3 & 4 \end{bmatrix}$.

b) Obtain the first four uniformly spaced points in the fourth and first quadrant of the circle $x^2 + y^2 = 4$.

c) Develop the concatenated transformation matrix for a reflection through the line $y = 2x - 1$.

**Q4)** Attempt any **TWO** of the following. (*6 mark each*)

                                                                        [12]

a) If the circle of the circumference $14\pi$ is uniformly scaled by 2 units , what is the area of the transformed circle?

b) If $B_0[2\ 1], B_1[4\ 4], B_2[5\ 3]$, are vertices of a Bezier polygon then determine the point $P\ (0.7)$ of the Bezier curve. Also find the first derivative of $P(t)$ corresponding to $t=0.3$.

c) Find an angle $\delta\theta$ to generate uniformly spaced point on the circumference of a circle in the second and third quadrant.

**Q5)** Attempt any **ONE** of the following.

                                                                     [12]

a) Prove that under any $2 \times 2$ transformation matrix point of intersection transforms to point of intersection.

b) Find the concatenated matrix required to make the plane $x + y + z = 0$ coincident with the $z = 0$ plane.

♦ ♦ ♦

Anekant Education Society's
# Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati.  (Empowered Autonomous)
## S.Y.B.Sc. (Computer Science) – Sem-III
### CSCO 2301 : Data Structure Using C
(2019 Pattern)
(No. of Credits 03)                    [Max Marks: 60]

[Time : 2 Hrs]

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## Instructions to the Candidates:

1) All questions are compulsory
2) Write programs wherever necessary.
3) Figures to the right indicate full marks.

(1 mark each)

## Q. 1. (A) Attempt EACH of the following.

(i) Define Data Structure.

(ii) Define Space Complexity .

(iii) Define weighted Graph.

(iv) Define the term : Priority Queue. List its types.

(2 mark each)

## (B) Attempt EACH of the following.

(i) Calculate the address of element A[2][2] in a character array A[3][4] in the row major representation. (Assume base address = 1000)

(ii) Write the node structure for a singly circular linked list.

(iii) Convert the following expression : $(A + B) * C - (D - E)$ to equivalent postfix notation.

(iv) 'Queue full condition in a linear queue necessary implies that there is no free space in array'. State True / False.

(4 mark each)

## Q. 2. Answer any THREE questions.

(i) Write short note on space complexity.

(ii) Sort the following elements using Bubble Sort. ( Write all Passes ) :
     92   21   41   71   51   31   81

(iii) Write a function to Merge two Sorted singly linked lists.

(iv) How can a graph be represented as an orthogonal list ? Explain with an example.

## Q.3. Answer any TWO questions.

(6 mark each)

(i) Write a function for adding and deleting elements from a circular queue.

(ii) Write C functions create, isEmpty, push and pop for stack using dynamic implementation.

(iii) Write a function to create a doubly linked list of 'n' nodes.

## Q. 4. Answer any TWO questions.

(6 mark each)

(i) Construct an AVL tree for the data: **MON, SUN, THU, FRI, SAT, WED, TUE**

(ii) Sort the following data using heap sort method : **72, 64, 65, 56, 32, 46, 54, 29, 48.**

(iii) Consider the following Adjacency matrix :

$$
\begin{array}{c}
\begin{array}{ccccc}
 & & & & \\
\end{array} \\
\begin{array}{c}
a \\ b \\ c \\ d \\ e
\end{array}
\begin{bmatrix}
0 & 1 & 0 & 1 & 1 \\
0 & 0 & 0 & 0 & 0 \\
0 & 1 & 0 & 0 & 0 \\
0 & 0 & 1 & 0 & 1 \\
0 & 0 & 0 & 0 & 0
\end{bmatrix} \\
\begin{array}{ccccc}
a & b & c & d & e
\end{array}
\end{array}
$$

a) Draw the graph

b) Find indegree and outdegree of all vertices    c) Draw the Adjacency list.

## Q.5. Answer any ONE questions.

(12 mark each)

(i) Explain the different applications in computer or real life where data structure might have used. (Explain at least 12 applications)

(ii) a) If the file contains multiple occurrences of a given element, linear search will give the position of the first occurrence. Write a function for linear search to get the last occurrence of given element ?                                                                    [06]

b) Generate a stack library with five operations (create,isempty,isfull,push,pop) available to implement the operation that deletes the bottom (not the top) element of the stack?    [06]

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Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati.
(Empowered Autonomous)
Affiliated to Savitribai Phule Pune University , Pune
S.Y.B.Sc. (Computer Science) – Sem IV
CSCO 2401: Object Oriented Concepts using Java
(2019 Pattern)
[No. of Credits 03]    [Max Marks: 60]

[Time : Two Hours]

**Instructions to the Candidates:**

1) All questions are compulsory
2) Write programs wherever necessary.
3) Figures to the right indicate full marks.                    (1 Marks Each)

**Q. 1. (A) Attempt each of the following.**                    [1]

1. Who created the java language?                              [1]

2. Name the exception thrown when an array in accessed beyond its bounds.  [1]

3. What method is used to compare two String objects?          [1]

4. State the two types of exceptions.                          (2 Marks Each)

**(B) Attempt each of the following.**                         [2]

1. Justify True / False: Java is not fully object oriented.    [2]

2. List the primitive types in java.                           [2]

3. List the important methods of Object class.                 [2]

4. A subclass should define a constructor if the superclass has one. Comment.

**Q. 2. Answer any THREE questions.**                          [4]

1. Explain the types of constructors.                          [4]

2. Explain the use of multiple catch blocks with suitable example.  [4]

3. Explain different types of Streams.                         [4]

4. Explain the primitive types in java.

## Q.3. Answer any TWO questions.

1. Write a program which keeps a count of the number of objects created using static variables and method.

[6]

2. Write a Java program to illustrate multilevel inheritance such that state is inherited from country. City is inherited from state. Display the areas, city, state and country.

[6]

3. Write a java program that accepts user name and password and throws exception "InvalidLogin" if they do not match.

[6]

## Q. 4. Answer any TWO questions.

1. Write a note on polymorphism and dynamic binding.

[6]

2. Write a program to display the command line arguments in reverse order.

[6]

3. Explain various tests that can be carried out on File objects.

[6]

## Q.5. Answer any TWO questions.

1. Differentiate between Java and C++.

[12]

2. What is diamond problem while using multiple inheritance in CPP? How Java overcomes this problem?

[12]

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Affiliated to Savitribai Phule Pune University, Pune

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

### ELECTRONICS

Semester III

CSEL 2301: Fundamentals of Memory Organization and Embedded System

(2019 Pattern)

Time: 2.00 Hours]                                    [Max marks: 60

----------------------------------------------------------------

**Instructions to the candidates:**

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

**Q. 1 Attempt the following.**                                    [12]

i)   What do you mean by Polling?                                   [1]

ii)  Define embedded system.                                       [1]

iii) Draw the block diagram of Harvard architecture.               [1]

iv)  What are various modes of data transfer?                      [1]

v)   Draw block diagram of computer system.                        [2]

vi)  State advantages of serial port communication.               [2]

vii) List various components of execution unit in 8086 microprocessor architecture.   [2]

viii) Write various applications of embedded system.              [2]

**Q. 2 Attempt _any three_ of the following.**                    [12]

i)   Differentiate Between RISC and CISC technology

ii)  Explain features of 8086 microprocessor architecture

iii) List various types of arduino. Write embedded C program to interface LED to arduino with suitable diagram.

iv)  What is DMA? With the help of neat schematic diagram describe the process of DMA transfer.

*P.T.O*

**Q. 3 Attempt any two of the following.**

[12]

i) What is the role of UART in serial dada communication? Draw a general block diagram of UART?

ii) Draw internal block diagram of 8086 microprocessor. Explain its execution unit.

iii) What is memory hierarchy? Explain two and three levels of memory hierarchy.

**Q. 4 Attempt any two of the following.**

[12]

i) What is the use of priority interrupt? With neat diagram, explain daisy chaining method of establishing the priority.

ii) Define memory mapping. Explain direct memory mapping with example.

iii) With neat block diagram, explain embedded system with its features.

**Q. 5 Attempt any one of the following.**

[12]

i) Write difference between signal core and multi-core processor. What is virtualization in multi-core technology? Explain homogeneous and heterogeneous core processor?

ii) What is virtual memory? With neat diagram explain how logical address is converted into physical address using paging and segmentation?

Total No. of Questions: 05

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**Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati**
**(Autonomous)**
**Affiliated to Savitribai Phule Pune University, Pune**
**S.Y. B.Sc. (Comp. Sci.) Electronics**
**CSEL2302: Analog Electronics**
**Semester- III**
**(2019 Pattern)**
**(No. of Credits 03)**

Max. Marks : 60

Time: Two Hours

Instructions to the candidates:
i. All questions are compulsory.
ii. Neat labelled diagrams must be drawn whenever necessary.
iii. Use of calculator is allowed.
iv. Figures to the right indicates full marks.

(1 Marks each)

Q.1. (A) Attempt **each** of the following
   i) What is Sensor?
   ii) Define resolution of ADC.
   iii) What is signal conditioning?
   iv) State any two applications of DAC.

(2 Marks each)

   (B) Attempt **each** of the following
   i) Draw the circuit diagram of non-inverting operational amplifier.
   ii) How many comparators are required for 10 bit flash ADC?
   iii) List any four features of LM35.
   iv) What is PIR sensor?

(4 Marks each)

Q.2. Attempt any **three** of the following
   i) Explain three op-amp instrumentation amplifier in detail.
   ii) Differentiate between active and passive sensor.
   iii) Explain 2-bit flash ADC in detail.
   iv) Draw the circuit diagram of inverting amplifier and derive expression for its gain.

(6 Marks each)

Q.3. Attempt any **two** of the following
   i) What is transducer? Explain working of LVDT in detail.
   ii) State and explain any six specifications of DAC in detail.
   iii) Design a band pass filter with $f_L$= 400Hz, $f_H$ = 1KHz and passband gain=4. Draw the designed circuit diagram.

(6 Marks each)

Q.4. Attempt any **two** of the following
   i) Explain intruder detector system in detail.
   ii) For a 5-bit R-2R ladder DAC, find the full scale output voltage, output due to LSB change and output voltage due for the input 11010. Compare the resistive divider type DAC and R-2R ladder DAC. Assume 0=0V, 1=5V.
   iii) Find out the expression for Wheatstone's meter bridge in balancing condition.

Q.5. Attempt any **one** of the following

    i) Analyse the digital data input (0001) for R-2R DAC network using Thevenin's theorem.

    ii) State and explain any six specifications of sensor. Explain working of LDR as optical sensor in detail.

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**Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati**
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**Affiliated to Savitribai Phule Pune University, Pune**
**S.Y. B.Sc. (Comp. Sci.) Electronics**
**CSEL2401: The Architecture, Interfacing and programming**
**Semester- IV**
**(2019 Pattern)**

e: 2:00 Hours

(No. of Credits 03)

Max. Marks : 60

ructions to the candidates:

All questions are compulsory.
Neat labelled diagrams must be drawn whenever necessary.
Use of calculator is allowed.
Figures to the right indicates full marks.

(A) Attempt **each** of the following                                   (1 Marks each)
i) List the number of ports in 8051 microcontroller?
ii) Write alternate functions of port 0 and port 2?
iii) What is SFR?
iv) What will be the output of ~0X55?

(B) Attempt **each** of the following                                   (2 Marks each)
i) Give capacity of RAM and ROM of 8051 microcontroller.
ii) Write any two features of PIC microcontroller.
iii) If A=31H, what will be the content of register A after 'SWAP A' operation?
iv) State the significance of PSEN pin in 8051 microcontroller.

                                                                        (4 Marks each)
Attempt any **three** of the following
i) Explain internal RAM architecture of 8051 microcontroller with a neat diagram.
ii) Write down the TMOD register and explain each bit of it.
iii) Differentiate between microcontroller and microprocessor.
iv) Write an assembly language program to unpack 2 digit packed BCD number present in RAM location 50H.

                                                                        (6 Marks each)
Attempt any **two** of the following
i) Write an 8051 C program to toggle the bits of P1 continuously with a 250 ms delay using for loop.
ii) With neat labelled diagram of ARM microcontroller explain in detail.
iii) How many timers are in 8051 microcontroller? Draw TMOD register and explain the function of each

                                                                        (6 Marks each)
Attempt any **two** of the following
i) Explain the architecture of 8051 microcontroller with neat diagram.
ii) Draw the circuit diagram for LED interfacing and write an 8051 C program for LED ON-OFF.
iii) Write a note on "Interrupts in 8051 microcontroller".

Q.5. Attempt any **one** of the following        (12 Marks each)
   i) Mention various features of 8051 microcontroller. With neat diagram, explain how single digit commo
   anode 7 segment displaycan be interfaced to 8051 with program.
   ii) Draw the diagram for LCD interfacing and write down 8051 C program to display "WELCOME" on
   LCD screen.

Total No. of Questions: 05

Anekant Education Society's

# Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati.
(Autonomous)

Affiliated to Savitribai Phule Pune University, Pune.

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

MATHEMATICS

Semester – III

CSMT 2301: *Linear Algebra*

(2019 Pattern)

Max. Marks: 60

Time: 2 Hours

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

**Q1)** (A) Attempt **each** of the following. (*1 mark each*) [04]

a) Find nullity of matrix $A$ of order $5 \times 6$ and $\text{rank}(A) = 3$.
b) If 2, 3, 1 are the eigenvalues of a matrix $A$ then find the eigenvalues of $A^{-1}$.
c) Define Linearly Independent Set.
d) What is the dimension of a vector space $R^{101}$.

(B) Attempt **each** of the following. (*2 mark each*) [08]

a) Is $S = \{(1, 1), (0, 1)\}$ is linearly independent subset of $\mathbb{R}$. Justify.
b) If $A = \begin{bmatrix} 4 & 0 \\ 0 & 5 \end{bmatrix}$ then find eigen values of $A$.
c) If 5, 2, 2 are eigen values of a matrix A then find the trace of A.
d) Express the following quadratic form in matrix form
$Q = x^2 + 2y^2 + 2xy$.

**Q2)** Attempt <u>any THREE</u> of the following. (*4 mark each*) [12]

a) Express $\bar{x} = (1, -2, 5)$ as a linear combination of the vectors $\bar{u} = (1, 1, 1)$, $\bar{v} = (1, 2, 3)$ and $\bar{w} = (2, -1, 1)$.

b) Find the standard matrix of the following linear operator $T: \mathbb{R}^2 \to \mathbb{R}^2$.

$$T\left(\begin{bmatrix} x_1 \\ x_2 \end{bmatrix}\right) = \begin{bmatrix} x_1 - 3x_2 \\ -2x_2 \end{bmatrix}$$

c) Let $T: \mathbb{R}^2 \to \mathbb{R}^2$ is defined as $T(x, y) = (x + y + 1, x + y)$. Determine whether $T$ is linear transformation.

*P.T.O.*

1

d) Show that the set of vectors $\{(1, 0, 0), (1, 1, 0), (1, 1, 1)\}$ forms a basis for $R^3$.

Q3) Attempt <u>any TWO</u> of the following. (*6 mark each*)

[12]

a) If $W_1$ and $W_2$ are subspaces of vector space $V$. Prove that $W_1 \cap W_2$ is a subspace of $V$.

b) If $\lambda$ is an eigenvalue of matrix $A$. Show that $\left[\frac{\det(A)}{\lambda}\right]$ is an eigenvalue of adjoint of $A$.

c) Find all eigen values of matrix $A$ and hence write the eigen values of $A^t$ and $A^{-1}$

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

Q4) Attempt <u>any TWO</u> of the following. (*6 mark each*)

[12]

a) Prove that a set S with two or more vectors is linearly independent if and only if no vector in S expressible as a linear combination of other vectors in S.

b) Determine if the set of vectors $\{(3, 1, -4), (2, 5, 6), (1, 4, 8)\}$ forms a basis for $\mathbb{R}^3$.

c) Prove that If $\lambda$ is an eigen values of a square matrix $A$ then $\lambda^m$ is an eigen value of $A^m$ for every positive integer $m$.

Q5) Attempt <u>any ONE</u> of the following. (*12 mark each*)

[12]

a) Prove that $R^n$ is vector space under the standard operations addition and scalar multiplication.

b) Find all eigenvalues of the matrix $A = \begin{bmatrix} 2 & 1 & 1 \\ 2 & 3 & 2 \\ 3 & 3 & 4 \end{bmatrix}$. Also find the basis of the eigenspace of $A$ corresponding to the smallest eigenvalues of $A$.

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Total No. of Questions: 05

Anekant Education Society's

**Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati.**

(Autonomous)

Affiliated to Savitribai Phule Pune University, Pune.

**S.Y. B.Sc.(Comp. Science)**

**MATHEMATICS**

**Semester – III**

**CSMT 2302:** *Numerical Analysis*

**(2019 Pattern)**

Max. Marks: 60

Time: 2 Hours

**Instructions to the Candidates:**

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

(1 Marks each)

**Q1) (A)** Attempt **each** of the following.

a) Define absolute error.
b) Round off 0.954236 correct to four significant figures.
c) Write the formula for Euler's modified method.
d) Write the formula for $h$ in Trapezoidal rule.

(2 Marks each)

**(B)** Attempt **each** of the following.

a) Write distributive law.
b) Given $\frac{dy}{dx} = -2y \, ; y(0) = 1$. Find $(0.1)$, using Euler's method take $(h=0.1)$.
c) If f(0)=0, f(1)=2, f(2)=6, f(3)=12 and f(4)=18. Evaluate $\int_0^3 f(x)dx$ by

Simpson's $\frac{3^{rth}}{8}$ rule

d) If $y = cosecx$ then find the error in $x$.

[12]

**Q2)** Attempt any **THREE** of the following. (*4 mark each*)

a) Find $\Delta^2(a^{2x+3})$ take $h = 1$.
b) Use Trapezoidal rule to evaluate $\int_0^2 \frac{1}{x} dx$ .( Take $h = 0.25$).
c) Prepare Newton's backward difference table for the given values of $x$ and $y$.

| x | 0 | 2 | 4 | 6 | 8 | 10 |
|---|---|---|---|---|---|----|
| y | 2 | 6 | 8 | 9 | 11 | 15 |

d) If $u_0 = 3, u_1 = 12, u_2 = 81, u_3 = 200, u_4 = 100, u_5 = 8$. Find the values of $\Delta^5 u_0$.

*P.T.O.*

**Q3)** Attempt any _TWO_ of the following. (*6 mark each*)                     [12]

a) Using Lagrange's interpolation formula express $\dfrac{x^2+6x+1}{(x-1)(x+1)(x-4)(x-6)}$ as a sum of partial fractions.

b) Estimate the missing term in the following table.

| x | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| y | 1 | 2 | 6 | ? | 51 |

c) Prove that $\Delta \log f(x) = \log[1 + \frac{\Delta f(x)}{f(x)}]$.

**Q4)** Attempt any _TWO_ of the following. (*6 mark each*)                     [12]

a) Solve $\frac{dy}{dx} = x + \sqrt{y}$, $y(0) = 4$ using Runge-kutta second order formula. Find $y(0.2)$ [Take h=0.1]

b) Evaluate $\int_0^6 \frac{dx}{x+1} dx$ by using Simpson's $\frac{3^{th}}{8}$ rule .(Take $h = 0.5$).

c) Find $y$ at $x = 1.5$ by using Newton-Gregory forward interpolation formula from the following data.

| x | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| y | 2 | 4 | 8 | 16 | 32 |

**Q5)** Attempt any _ONE_ of the following.                     [12]

a) i) Find the interpolating polynomial $f(x)$ for the following data. Find the value of $y$ at $x = 1.5$

| x | 0 | 1 | 2 | 5 |
|---|---|---|---|---|
| y | 2 | 3 | 12 | 147 |

ii) Prove that $(1 + \Delta)(1 - \nabla) = 1$

b) Determine the value of $y$ when $x = 0.1$ by Euler's modified method $y(0) = 1$, $y(1) = x^2 + y$.

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Total No. of Questions: 05

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**S.Y.B.Sc.(Comp.Science)**

**MATHEMATICS**

**Semester – IV**

**CSMT 2401:Computational Geometry**

**(2019 Pattern)(Paper I)**

*[Max. Marks: 60*

*Time: 2 Hours 30 Minutes]*

*Instructions to the Candidates:*

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

[12]

**Q1)** Attempt the following.                                                          [1]

a) Write the transformation matrix for shearing along $x$-direction.                  [1]

b) Determine whether the transformation matrix $[T] = \begin{bmatrix} \frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} \\ \frac{1}{\sqrt{2}} & -\frac{1}{\sqrt{2}} \end{bmatrix}$ represents a reflection.

Justify your answer.                                                                   [1]

c) Write the transformation matrix for scaling in $z$ –coordinate.                     [1]

d) Define the term: Defining polygon.                                                  [1]

e) What is the parametric equation of hyperbola?                                       [2]

f) Give an example of axonometric projection.                                          [2]

g) Write the transformation matrix for shear in x-coordinate by factor 6 units proportional
To $y$-coordinate and shear in z-coordinate by a factor of 3 units proportional to
$x$-coordinate.                                                                        [2]

h) Write the parametric equation of Bezier curve with control points$B_0$ , $B_1$ , $B_2$, $B_3$.   [2]

[12]

**Q2)** Attempt any *THREE* of the following. (*4 mark each*)

a) If the line segment between the points $A(4,9)$ , $B(3,2)$ is transformed to the line segment
$A'B'$ by the transformation matrix $[T] = \begin{bmatrix} -1 & 4 \\ 4 & 2 \end{bmatrix}$. Find the midpoint of $A'B'$.

b) Obtain the concatenated transformation matrix for the following sequence of
transformations: Translate in $x$ , $y$ , $z$ direction by $-1$ ,2 , 1 units respectively followed by
rotation about z-axis by an angle $90°$ followed by a reflection in $z=0$ planes. Apply it on
the point [1 2 3].

-1-

c) Write the matrix equation form of a parametric equation of Bezier curve for 4 control points $B_0$, $B_1$, $B_2$, $B_3$.

d) Write the transformation matrix for diametric projection with $f_z = \frac{3}{8}$ ($\emptyset > 0$, $\theta > 0$).

**Q3)** Attempt any *TWO* of the following. (*6 mark each*)

[12]

a) Prove that, if a $2 \times 2$ transformation matrix transforms the point $P$ and $Q$ to the point $P^*$ and $Q^*$ respectively .If $R$ divides segment $PQ$ internally in the ratio $m:n$ then its transformed point $R^*$ divides the segment $P^*$ and $Q^*$ internally in the ratio $:n$.

b) Obtain equispaced 6 points of the circle $(x-1)^2 + (y+2)^2 = 9$.

c) Find the cabinet and cavalier projection of the object represented by the following position vector matrix with a horizontal inclination angle $\alpha = 25°$

$$X = \begin{bmatrix} 1 & 2 & 1 \\ 3 & 4 & -1 \\ -1 & -2 & 1 \\ 2 & 1 & 1 \end{bmatrix}.$$

**Q4)** Attempt any *TWO* of the following. (*6 mark each*)

[12]

a) Consider the line with direction ratios 1, 1, 1 and passing through the origin .Determined by the angles through which the line should be rotated about $x$-axis and then about $y$-axis so that it coincides with $z$-axis.

b) Consider the Bezier curve determined by the control points $B_0[4\ 3]$, $B_1[0\ 1]$, $B_2[2\ -1]$.Then find first and second derivatives of the curve $t=0.3$.

c) Write an algorithm to generate uniformly spaced $n$ points on the standard circle $x^2 + y^2 = r^2$.

**Q5)** Attempt any *ONE* of the following.

[12]

a) Prove that, under any $2 \times 2$ transformation matrix point of intersection transforms to point of intersection.

b) i) Obtain equispaced 3 points on the hyperbola $\frac{(x-1)^2}{9} - \frac{(y+2)^2}{16} = 1$ in the first quadrant $4 \leq x \leq 9$ inclined by an angle $\theta = 45°$ about positive x-axis.

ii) Obtain equispaced 4 points of arc of parabola $x^2 = 12y$ in the first quadrant for $2 \leq y \leq 5$.

Total No. of Questions: 05

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**S.Y.B.Sc.(Computer Science)**
**MATHEMATICS**
Semester – IV
CSMT2402: *Operation Research*
(2019 Pattern) (Paper – II)

[*Max. Marks: 60*

*Time: 2 Hours 30 Minutes*]
*Instructions to the Candidates:*
  1) *All questions are compulsory.*
  2) *Figures to the right indicate full marks.*
  3) *Use of Non-programmable scientific calculator is allowed.*

**Q1)** Attempt the following.  [12]

a) Write the advantages of dual.  [1]
b) Which method gives better solution for finding an IBFS of a transportation problem.  [1]
c) Define Balanced Transportation Problem.  [1]
d) Define two person zero-sum game.  [1]
e) Convert the following L.P.P. into canonical form:  [2]

$$Max\ Z = 10x_1 + 7x_2$$

Subject to,
$$x_1 - 3x_2 = 12$$
$$-x_1 + x_2 \geq -1$$
$$x_1, x_2 \geq 0.$$

f) How do you convert the maximization assignment problem into minimization one.  [2]
g) Determine the saddle point and optimum strategies for each player in the following game.  [2]

$$\begin{array}{c} \text{Player } B \\ \text{Player } A \begin{bmatrix} 3 & 5 & 4 \\ 2 & -2 & -1 \\ 0 & 7 & 2 \end{bmatrix} \end{array}$$

h) Covert the following maximization assignment problem into minimization problem.  [2]

|     | A  | B  | C  |
|-----|----|----|----|
| I   | 32 | 38 | 40 |
| II  | 40 | 24 | 28 |
| III | 41 | 27 | 33 |

*P.T.O.*

**Q2)** Attempt any *THREE* of the following. (*4 mark each*)                                        [12]

a) Solve the following LPP by graphical method.

$$\text{Min } z = 4x - 2y$$

Subject to,

$$x + y \leq 14$$
$$3x + 2y \geq 36$$
$$2x + y \leq 24$$
$$x, y \geq 0.$$

b) Write the dual of the following LPP.

$$\text{Min } Z = 75x_1 + 125x_2 + 150x_3$$

Subject to,

$$x_1 + x_2 + x_3 \leq 500$$
$$x_1 + x_3 \geq 150$$
$$x_1 - x_2 - x_3 = 100$$
$$x_1, x_2, x_3 \geq 0.$$

c) Find an IBFS of the following transportation problem by least cost method.

Destinations

|        |        | I  | II | III | IV | Capacity |
|--------|--------|----|----|-----|----|----------|
|        | P      | 10 | 30 | 20  | 13 | 5        |
| Origin | Q      | 22 | 9  | 7   | 16 | 10       |
|        | R      | 4  | 32 | 5   | 29 | 15       |
|        | Demand | 5  | 5  | 10  | 10 |          |

d) Solve the following game by a algebraic method.

Player B

|          |    | I  | II |
|----------|----|----|----|
| Player A | I  | 20 | -6 |
|          | II | -4 | 3  |

**Q3)** Attempt any *TWO* of the following. (*6 mark each*)                                        [12]

a) Solve the following assignment problem for minimization.

|   | I  | II | III | IV | V  |
|---|----|----|-----|----|----|
| A | 9  | 11 | 15  | 10 | 11 |
| B | 12 | 9  | -   | 10 | 9  |
| C | -  | 11 | 14  | 11 | 7  |
| D | 14 | 8  | 12  | 7  | 8  |

b) A firm manufacturer two type of products A and B and sells them at a profit of Rs. 2 on type A and Rs. 3 on product B. Each product is processed on two machines G and H. Type A requires one minute of processing time on G and two minutes on H. Type B requires one minute on G and one minute on H. The machine G and H is available for not more than 400 minute and 600 minutes respectively during any working day. Formulate the problem as a LPP.

c) Find IBFs of the following transportation problem by Vogel's Approximation Method.

|       | $D_1$ | $D_2$ | $D_3$ | $D_4$ | Supply |
|-------|-------|-------|-------|-------|--------|
| $O_1$ | 1     | 2     | -2    | 3     | 70     |
| $O_2$ | 2     | 4     | 0     | 1     | 38     |
| $O_3$ | 1     | 2     | -2    | 5     | 32     |
| Demand| 40    | 28    | 30    | 42    |        |

**Q4)** Attempt any *TWO* of the following. (*6 mark each*)                    [12]

a) Find IBFS of the following transportation problem by North-West Corner Method to maximize the profit.

|       | $D_1$ | $D_2$ | $D_3$ | $D_4$ | Supply |
|-------|-------|-------|-------|-------|--------|
| $O_1$ | 30    | 25    | 40    | 20    | 100    |
| $O_2$ | 29    | 26    | 35    | 40    | 250    |
| $O_3$ | 31    | 33    | 37    | 30    | 150    |
| Demand| 90    | 160   | 200   | 50    |        |

b) Solve the following LPP by simplex method.

$$\text{Max } z = 2x_1 + 3x_2$$

Subject to,
$$-3x_1 + x_2 \le 4$$
$$x_1 - x_2 \le 2$$
$$x_1, x_2 \ge 0.$$

*P.T.O.*

c) Solve the following 2*3 game graphically.

Player B

| Player A | | I | II | III |
|---|---|---|---|---|
| | I | 6 | 7 | 15 |
| | II | 20 | 12 | 10 |

Q5) Attempt any *ONE* of the following.

[12]

a) Solve the following LPP by Big-M method.

$$\text{Min } z = 2x_1 + 8x_2$$

Subject to,

$$5x_1 + 10x_2 \geq 10$$
$$x_1 \leq 14$$
$$x_1, x_2 \geq 0.$$

b) Solve the following assignment problem to maximize the profit.

Jobs

| | | I | II | III | IV | V | VI |
|---|---|---|---|---|---|---|---|
| | 1 | 9 | 22 | 58 | 11 | 19 | 27 |
| | 2 | 43 | 78 | 72 | 50 | 63 | 48 |
| Mechanics | 3 | 41 | 28 | 91 | 37 | 45 | 33 |
| | 4 | 74 | 42 | 27 | 49 | 39 | 32 |
| | 5 | 36 | 11 | 57 | 22 | 25 | 18 |
| | 6 | 13 | 56 | 53 | 31 | 17 | 28 |

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Anekant Education Society's
Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati
(Autonomous)
Affiliated to Savitribai Phule Pune University, Pune
S.Y. B.Sc. (Comp. Sci.)Electronics
UCSEL232: Instrumentation Systems
Semester- III
(2022 Pattern)

Time : 2.00 Hours          (No. of Credits 03)          Max. Marks : 60

Instructions to the candidate :

i.      All questions are compulsory.
ii.     Neat labeled diagrams must be drawn whenever necessary.
iii.    Use of calculator is allowed.
iv.    Figures to the right indicates full marks.

-----------------------------------------------------------------

Q.1. (A) Attempt **each** Of the following :                               (1marks each)
         i) Define DAC
         ii) What is Operational amplifier?
         iii) State any two important specification of ADC
         iv) Define cutoff frequency.

    (B) Attempt **each** Of the following :                                (2marks each)
         i) Draw the circuit diagram of a band pass filter.
         ii) What is LVDT.
         iii) Define the terms accuracy and sensitivity.
         iv) What is quantisation error?

Q.2 Attempt any **three** Of the following :                               (4marks each)
         i) Explain the operation of dual slope ADC .
         ii) Write a short note on DSO.
         iii) Define Inverting Op-amp and derive expression for o/p gain.
         iv) Explain any four specification of op-amp.

Q.3 Attempt any **two** Of the following :                                 (6marks each)
         i) Explain with help of circuit diagram and operation of LPF. draw its characteristics.
         ii) Explain the basics principle of a D to A converter details.
         iii) Write a short note on digital multimeter.

1

Total No. of Questions: 5

Anekant Education Society's
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Affiliated to Savitribai Phule Pune University, Pune
S.Y. B.Sc. (Comp. Sci.) Electronics
UCSEL232: Instrumentation Systems
Semester- III
(2022 Pattern)

(No. of Credits 03)

Max. Marks : 60

Time : 2.00 Hours

**Instructions to the candidate :**

i.    All questions are compulsory.
ii.   Neat labeled diagrams must be drawn whenever necessary.
iii.  Use of calculator is allowed.
iv.   Figures to the right indicates full marks.

-----------------------------------------------------------------

(1 marks each)

Q.1. (A) Attempt **each** Of the following :
   i) Define DAC
   ii) What is Operational amplifier?
   iii) State any two important specification of ADC
   iv) Define cutoff frequency.

(2 marks each)

   (B) Attempt **each** Of the following :
   i) Draw the circuit diagram of a band pass filter.
   ii) What is LVDT.
   iii) Define the terms accuracy and sensitivity.
   iv) What is quantisation error?

(4 marks each)

Q.2  Attempt any **three** Of the following :
   i) Explain the operation of dual slope ADC .
   ii) Write a short note on DSO.
   iii) Define Inverting Op-amp and derive expression for o/p gain.
   iv) Explain any four specification of op-amp.

(6 marks each)

Q.3  Attempt any **two** Of the following :
   i) Explain with help of circuit diagram and operation of LPF. draw its characteristics.
   ii) Explain the basics principle of a D to A converter details.
   iii) Write a short note on digital multimeter.

Q.4  Attempt any **two** Of the following :                                              (6marks each)
      i) Draw the circuit of band stop filter and explain it's working.
      ii) Solve – for a 6 bit binary R-2R ladder network .assume '0'=0 volt and '1'=10volt .find the o/p voltages for following digital i/p

    a)  101001          b) 11001
    iii)  Give Difference between base sensor and smart sensor .

Q.5  Attempt any **one** Of the following :                                              (12marks each)
    i)   Draw the circuit diagram for 3-bit flash ADC. And explain its working in details.Define the terms –conversion error and quantization error" in case of an ADC.
    Solve- A 5bit R-2R ladder network with 0=0 volt and 1=10volt
    Find- a) analog o/p due to LSB change   b) full scale o/p voltage. write down its application of ADC.
    2) What is filter? Give classification of filter. Draw the circuit diagram of HPF and explain it's working with response curve in detail Derive  expression for gain of the HPF.


------------------------------------------BEST     OF   LUCK   ---------------------------------------------

**Anekant Education Society's**

**Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati.**

(Autonomous)

Affiliated to Savitribai Phule Pune University, Pune.

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

## ELECTRONICS

## UCSEL241: Advance Embedded System

(2022 Pattern)

Time: Two Hours          (No. of Credits 03)          Max Marks: 60

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**Instructions to Candidates:**

I. All Questions are compulsory
II. Neat Labeled Diagrams must be drawn whenever necessary
III. Use of calculator is allowed
IV. Figures to the right indicate full marks

**Q1. (A) Attempt each of the following.**                    (1 Mark each)

(i) Write the full form of CAN protocol.

(ii) What is the clock frequency of Arduino UNO board?

(iii) Which are two communication interfaces?

(iv) Name any one temperature sensor.

**(B) Attempt each of the following.**                    (2 Marks each)

(i) Write about the 4th generation embedded system.

(ii) Write about the infrared communication interface.

(iii) What is Blynk IoT?

(iv) List any four specifications of Arduino.

P. T. O.

**Q2. Answer any three questions.**

(4 Marks each)

i) Draw and explain the block diagram of single board computer.

ii) Write a note on history of Embedded Systems.

iii) Explain the SPI communication interface protocol.

iv) Write down the program code for LED blinking in Arduino with a neat diagram.

**Q3. Answer any two questions.**

(6 Marks each)

(i) Draw the diagram for 7 segment display interfacing with Arduino and write up the code for it.

(ii) What is the purpose of embedded system design? Explain in detail.

(iii) Write a note on Network Access Devices.

**Q4. Answer any two questions.**

(6 Marks each)

(i) Explain in detail ZigBee communication interface.

(ii) Draw block diagram of intruder detector system and explain its working. Write down program for interfacing.

iii) What do you mean by an embedded system? Write the characteristics of an embedded system.

**Q5. Answer any one question.**

(12 Marks each)

i) Draw the diagram for LCD interfacing with Arduino and write down program code for it to display "HELLO" on LCD screen.

ii) Write a note on Arduino Microcontroller board.

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