PROFESSIONAL COMMUNICATION SKILLS
SUBJECT: Professional Communication Skills

UNIT I
The Seven Cs of Effective Communication
Completeness, Conciseness, Consideration, Concreteness, Clarity, Courtesy, Correctness

UNIT II
Communication: Its interpretation
Basics, Nonverbal Communication, Barriers to Communication

UNIT III
Business Communication at Work Place:
Letter Components and Layout, Planning a letter, Process of Letter writing, E-mail Communication, Memo and Memo reports, Employment Communication, Notice agenda and Minutes of meeting, Brochures

UNIT IV
Report Writing
Effective writing, types of business reports, structure of reports, gathering information, organization of the material, writing abstracts and summaries, writing definitions, visual aids, user instruction manual.

UNIT V
Required Skills
Reading skills, listening skills, note-making, précis writing, audiovisual aids, oral communication

UNIT VI
Mechanics of Writing
Transitions, Spelling rules, hyphenation, transcribing numbers, Abbreviating technical and non-technical terms, Proof reading.
UNIT I

1. Define the term communication. List the important attributes of communication.

2. List the major objectives of communication. Explain any one.

3. Elaborate any two principles of effective communication.

4. How does knowledge and attitude affect communication?

5. Explain the importance of effective communication.

6. How does analyzing audience and selecting proper channels help in developing effective messages?

7. "Word, expressions used in the business letter should be specific and concrete in nature". Explain the statement.

8. Explain how conciseness is the essence of a business letter.

9. Is feedback important for communication process? Justify. Clarity, conciseness, correctness and courtesy are some of the basic principles used in the letter writing.

10. Discuss language and style used in technical writing and official correspondence in the light of above statement giving example for each.

11. Communication should be flexible to suit the changing requirements of the organization. Explain the statement.

12. Explain how integrated system of communication helps enterprise achieve goals.

13. Discuss how communication becomes effective by supporting formal communication with informal contacts.

14. Differentiate between courtesy and candid elements of communication.
UNIT II

1. Justify the need of communication in a society.
2. Explain the importance of communication.
3. Explain "Communication is a tool of supervision".
4. Explain communication cycle with the help of a diagram.
5. Describe the five distinct elements of communication.
6. Discuss the stages in the communication process.
7. Explain with the tree diagram different types of communication.
8. Differentiate between Internal and External communication.
9. Differentiate between Formal and Informal communication.
10. Compare Horizontal and Vertical communication.
11. Write short note on Diagonal communication.
12. Discuss the advantages and disadvantages of oral communication.
13. Discuss the advantages and disadvantages of written communication.
14. Define Non verbal communication and list the advantages.
15. Define the following terms: Kinesics, Eye contact, Gestures, Postures, Proxemics, Haptics, Vocalics, Chronemics
16. What role does 'Encoding and Decoding' play in a communication?
17. What is mechanical barrier?
18. What kind of barriers disrupts oral and written communication?
19. How can language act as a barrier to communication?
20. How does knowledge and attitude affect communication?
21. Explain the importance of eye contact in communication.
22. State the importance of 'gestures' in face to face oral communication.
23. What is the importance of artifacts in communication?
24. How does the sender's dress and appearance have an impact upon his/her communication?
25. Explain any five remedies which can be adapted to overcome the barriers of effective communication.
26. Describe the importance of noise in oral communication.
27. How the uses of technical jargons act as a barrier to communication? Give examples.
UNIT III

1. Write a letter to the Registrar University Of Delhi.Main Building ,University of Delhi-16 inquiring about the kind of professional courses they offer and requesting a copy of their prospectus.

2. Write down a reply for the enquiry you have received for furniture items from a new educational institution which is opening in your town shortly. Give all details regarding quality, material used, type and cost involved and make a quotation for the same. Use semi block form for your letter.

3. You want to purchase some electrical equipment for your workshop. Write a letter of inquirt to Hindustan Electrical appliances Company Ltd, Pune.

4. Draft a notice inviting the members to attend the meeting of board of directors of the company.

5. You are the magazine secretary of your institute. Draft a circular inviting articles from students to be published in the college magazine.

6. One of your colleagues has to undergo a kidney operation for which he needs two lakhs urgently. Draft a circular informing your colleagues to donate Rs 200/- each.

7. As a workshop supervisor, device a memo for the employees on the following points. 
   Subject: Employees staying out late during tea break. 
   Purpose: To warn the workers about the loss in work hours.

8. Your industry has not been able to meet the production target for the month because of excessive leave of the workers. As a manager draft a memorandum warning the workers that if trend continues their bonus will be reduced.

9. Draft a letter of application as a response to the following advertisement: "Required purchase officer, Qualification BE/Diploma in Electrical Engineering able to do independent correspondances, computer literate and having experience in similar field. Apply with resume to Cosmos Ltd, 72 - E Industrial Area, Andheri(East), Mumbai - 400093

10. As a head of mechanical department device a memo for the third year students on the following points: 
    Subject: Poor attendance in the class.

11. Assume that you are head of the department of Medical department of your college. You have planned a 2 week course in yoga and meditation to help third year students of medical. Prepare a notice for the department’s notice board, stating the objective of the course, giving necessary details of the course and asking students to join the course.

12. Draft the design of Educational brochure.

13. Explain different steps in preparing the brochure.

14. Briefly discuss the features of the brochure layout.

15. Write short note on Electronic Mail.
UNIT IV

1. Write a report on the sudden decrease in the production of biscuit factory. Give suggestions.
2. Write a report on the causes of the decline in the bank’s business during 2009-2010.
3. As a lab incharge write a report to the principal about the accident took place in the chemistry lab while conducting practical. Suggest some safety measures.
4. Comprehend and summarize the following passage:
   The walnut tree produces wood that is used for countless purposes, and is considered the finest wood in the world. The wood is easy to work with, yet it is very hard and durable—and when it is polished, it produces a rich, dark luster. It also shrinks and swells less than any other wood, which makes it especially desirable for fine furniture, flooring, and even gun stocks.

   In fact, just about every part of the walnut is unusually hard and strong. The nut of the tree is encased inside a very hard shell, which itself is enclosed in a leathery outer covering called a husk. It requires real effort to break through those layers to get at the tasty meat inside.

   Yet every part of the walnut is useful to people. The outer husk produces a dark reddish stain that is hard to remove from the hands of the person who opens the nut, and this pigment is widely used in dyes and wood stains. The inner shell is used as an abrasive to clean jet engines. And the meat of the nut is extensively used in cooking, ice cream, flavorings—and just eaten raw.

   Walnut trees exude a chemical into the soil near their roots which can be poisonous to some trees and shrubs. Fruit trees, for example, will not survive if planted too close to a walnut. Many other plants, such as maple trees or ivy, are not affected by the walnut’s presence, and are well-suited to grow in its vicinity.

   **Answer the following questions on the paragraph above**
   
   1. What is the topic of this passage?
   2. What is the main idea of the passage?
   3. The author of the passage probably believes that
4. As used in the passage, the underlined word abrasive most nearly means
5. As used in the passage, the underlined word exude most nearly means

6. Summarize the above passage in your own words
5. Write the instructions for sending SMS using a mobile phone.
6. Write the instructions for drawing a demand draft.
7. What are the characteristics of a Good Definition?
8. What are the different types of definition?
9. **Define the following terms:**
   a) Accumulator          b) Abrasion          c) Calculator
   d) Dynamo              e) Hacksaw           f) Voltmeter
   g) Lactometer          h) Anemoscope        i) Air compressor
10. What are the objectives of the abstracts?
11. Differentiate between Descriptive and Informative Abstract.
12. What are the methods for collecting data for a report?
14. Explain different types of writing.
UNIT V

1. Differentiate between Listening and Hearing.
2. Explain the process of Listening.
3. Discuss the three phases of Listening according to "HORRWORTH GLORI".
4. Differentiate between Active and Passive Listening.
5. Differentiate between Appreciative and Preventive Listening.
6. Explain any three barriers to Effective Listening.
7. Discuss any four techniques which can be used to improve Listening skills.
8. Explain the process of Reading.
9. Discuss the different types of Reading.
10. Differentiate between Extensive and Intensive Reading.
11. Explain Aesthetic and Epherent Reading.
12. Discuss the various speeds of Reading.
13. Briefly explain the different types of Readers.
14. What are the basic barriers to Reading process?
15. Discuss the techniques of effective reading.
16. Explain the process of Speaking.
17. What are the techniques through which participation van be improved?
18. Briefly explain the components of an Elocution.
19. Discuss the different techniques of Effective Elocution.
20. Write short note on Group Discussion.
21. Explain the procedure of Group Discussion.
22. Explain the types of topics of Group Discussion.
23. Discuss the evaluation criteria of Group Discussion.
24. What is a good precise?
25. List the basic steps in Precise writing.
26. Explain the Psychological impact of colour in Presentations.
27. Discuss briefly the types of Audio and Visual Aids in communication.
UNIT VI

1. Define Transition words and discuss how do we use transition words.
2. Explain the importance of Proofreading.
3. Discuss the Proofreading process.
4. What are the different methods of Proofreading?
5. List the guidelines for Proofreading.
6. Write the meaning of the following abbreviations used in proof reading:
   1. AB  2. Awk
   3. CS  4. -ed
   5. Dgl  6. Pron
   7. -s  8. STET
   9. T  10. WW

7. Write the use of following transitional words:
   a) Then  b) As a result  c) In response  d) Because of this,
   e) Consequently  f) In spite of
   g) However  h) In addition  i) Besides that  j) Likewise
   k) Also  l) One such  m) That too

8. Write the correct Spelling of following words:
   a) February  b) recommend  d) perceive  e) lazer
   f) grammer  g) expresso  h) dissappooint  i) piece.

9. Define the following abbreviations:

   1. AC  20. ICAC  39. SCL
   2. APPLE  21. ICAQ  40. SEEPZ
   3. ABT  22. IIBM  41. SEBI
   4. BEL  23. IRAS  42. SMS
   5. BPO  24. IRCS  43. SSD
   6. CAIR  25. IRO  44. START
   7. CID  26. ISAS  45. TCI
   8. DST  27. ITU  46. TELEX
   9. DM  28. IWT  47. UNESCO
   10. EEC  29. KG  48. UPSC
   11. EEG  30. MCA  49. VAT
   12. ECG  31. MD  50. YMCA
   13. FBI  32. NCB  51. IATA
   14. FICCI  33. NCCR  52. RMS
   15. ICCI  34. NFL
   16. GSI  35. NIC
   17. GPRS  36. PCS
   18. HAL  37. PVC
   19. HCF  38. RBI
APPLIED MATHEMATICS-I
SUBJECT: Applied Mathematics-I

UNIT I
Matrices:

Unit- II
Eigen Values and Eigen Vectors:

Unit -III
Vector Calculus:
Vector Differentiation: Vector Operator Del, Gradient, and Geometrical Meaning of gradient, Divergence and Curl.

Unit - IV
Differential Equations:
Differential Equations of 1st order and 1st degree and applications

Unit - V
Linear Differential Equations:
Linear Differential equations with constant coefficient, Differential equations of higher order and applications.

Unit - VI
Successive differentiation, Mean Value theorems, Partial differentiation, Euler’s Theorem, Approximation and errors, Maxima and Minima
UNIT I

1. Express the matrix $A$ as the sum of symmetric and skew-symmetric matrices, where

$$A = \begin{bmatrix} -1 & 7 & 1 \\ 2 & 3 & 4 \\ 5 & 0 & 5 \end{bmatrix}$$

2. IF $A = \begin{bmatrix} 2 & -1 & 1 \\ 3 & -4 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 2 \\ -3 & 1 \\ 4 & -1 \end{bmatrix}$ is the matrix $AB$ non-singular?

3. If $A = \begin{bmatrix} 1 & 2 & 3 \\ 1 & 3 & 5 \\ 1 & 5 & 12 \end{bmatrix}$, Compute adjoint $A$ and verify that $A(adj A) = |a| I$

4. Find the inverse matrix by using adjoint method. $A = \begin{bmatrix} 1 & 2 & -2 \\ -1 & 3 & 0 \\ 0 & -2 & 1 \end{bmatrix}$

5. Find the inverse of matrix by using adjoining method $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 5 \\ 3 & 5 & 6 \end{bmatrix}$

6. Reduce to normal form the matrix $A$ and find its rank.

$$A = \begin{bmatrix} 3 & 2 & 5 & 7 & 12 \\ 1 & 1 & 2 & 3 & 5 \\ 3 & 3 & 6 & 9 & 15 \end{bmatrix}$$

7. Reduce the following matrix to normal form and hence find its rank.

$$A = \begin{bmatrix} 6 & 1 & 3 & 8 \\ 4 & 2 & 6 & -1 \\ 10 & 3 & 9 & 7 \end{bmatrix}$$ and $A = \begin{bmatrix} 2 & 2 & 4 & 6 \\ 3 & 1 & 0 & 8 \\ 1 & 3 & 2 & 7 \end{bmatrix}$

8. Find two non-singular matrices $P$ and $Q$ so that $P A Q$ is in normal form.

where, $A = \begin{bmatrix} 3 & 1 & -1 & 2 \\ 6 & 1 & 2 & -2 \\ 1 & 6 & 2 & 1 \end{bmatrix}$
9. Examine the consistency and solve (Non Homogeneous)

i. \[5x + 3y + 7z = 4\]
   \[3x + 26y + 2z = 9\]
   \[7x + 2y + 10z = 5\]

ii. \[2x_1 + x_2 + 2x_3 + x_4 = 6\]
    \[6x_1 - 6x_2 + 6x_3 + 12x_4 = 36\]
    \[4x_1 + 3x_2 + 3x_3 - 3x_4 = -1\]
    \[2x_1 + 2x_2 - x_3 + x_4 = 10\]

iii. \[x_1 - x_2 + x_3 - x_4 + x_5 = 1\]
     \[2x_1 - x_2 + 3x_3 + 4x_5 = 2\]
     \[3x_1 - 2x_2 + 2x_3 + x_4 + x_5 = 1\]
     \[x_1 + x_3 + 2x_4 + x_5 = 0\]

10. Examine the consistency and solve (Non Homogeneous)

i. \[2x - 2y + 5z + 3w = 0\]
    \[4x - y + z + w = 0\]
    \[3x - 2y + 3z + 4w = 0\]
    \[x - 3y + 7z + 4w = 0\]

ii. \[X_1 + x_2 + x_3 = 0\]
    \[2X_1 + 3x_2 + x_3 = 0\]
    \[4X_1 + 5x_2 + 4x_3 = 0\]
    \[X_1 + x_2 - 2x_3 = 0\]

iii. \[X_1 + 2x_2 + 3x_3 + x_4 = 0\]
    \[X_1 + x_2 - x_3 - x_4 = 0\]
    \[3X_1 - x_2 + 2x_3 + 3x_4 = 0\]
UNIT-II

1. Express the Skew-Hermitian matrix $A$ as $P+iQ$ where $P$ is Skew-Symmetric and $Q$ is Real Symmetric matrix 

$$A = \begin{bmatrix} 2i & 2 + i & 1 - i \\ -2 + i & -1 & 3i \\ -1 - i & 3i & 0 \end{bmatrix}$$

2. Show that the matrix $A = \frac{1}{2} \begin{bmatrix} \sqrt{2} & -i \sqrt{2} & 0 \\ i \sqrt{2} & -\sqrt{2} & 0 \\ 0 & 0 & 2 \end{bmatrix}$ is Unitary and hence find $A^{-1}$

3. Prove that $A = \frac{1}{3} \begin{bmatrix} -2 & 1 & 2 \\ 2 & 2 & 1 \\ 1 & -2 & 2 \end{bmatrix}$ is Orthogonal and hence find $A^{-1}$.

4. Check whether matrix $P$ is Derogatory or Non-Derogatory

$$P = \begin{bmatrix} 1 & 1 & 3 \\ 5 & 2 & 6 \\ -2 & -1 & -3 \end{bmatrix}$$

5. Find the Eigen values and Eigen vectors of the matrix

$$A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$$

6. Verify the Cayley Hamilton Theorem and use it to find $A^{-1}$

$$A = \begin{bmatrix} 1 & 2 & -2 \\ -1 & 3 & 0 \\ 0 & -2 & 2 \end{bmatrix}$$

7. Find the matrix $A^6 - 25A^2 + 122A$ where $A = \begin{bmatrix} 0 & 0 & 2 \\ 2 & 1 & 0 \\ -1 & -1 & 3 \end{bmatrix}$

8. Verify Cayley Hamilton theorem and use it to find $A^4$ and $A^5$.

$$A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

9. Express $A = P + iQ$ such that $P$ and $Q$ are both Hermitian.

$$A = \begin{bmatrix} 2 & 3 - i & 2 + i \\ 1 & 0 & 1 - i \\ 1 + 2i & 1 & 3i \end{bmatrix}$$
10. Find the Eigen values and Eigen vectors of the matrix.
\[ B = \begin{bmatrix} 1 & -6 & -4 \\ 0 & 4 & 2 \\ 0 & -6 & -3 \end{bmatrix} \]

11. Find the Eigen values and Eigen vectors of the matrix.
\[ A = \begin{bmatrix} 1 & 0 & -1 \\ 1 & 2 & 1 \\ 2 & 2 & 3 \end{bmatrix} \]

12. Verify Cayley Hamilton theorem and use it to find \( A^{-1} \) and \( A^{-2} \).
\[ A = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & -3 & 3 \end{bmatrix} \]

13. Find the Characteristics equation matrix. \( A = \begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 3 \end{bmatrix} \) and hence find matrix represented by \( A^8 - 5A^7 + 7A^6 - 3A^5 + A^4 - 5A^3 + 8A^2 - 2A + I \)

14. Find minimal polynomial \( P = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 2 & 3 \\ 0 & 0 & 3 \end{bmatrix} \).
UNIT-III

1. Find the angle between the tangents to the curve \( \vec{r} = t^2i + 2tj - t^3k \) at the points \( t = \pm 1 \).

2. A particle moves along a plane curve such that its linear velocity is perpendicular to the radius vector. Show that the path of the particle is a circle.

3. If \( \vec{r} = a \cos t \ i + a \sin t \ j + a \tan \alpha \ k \), find \( \frac{d^2 \vec{r}}{dt^2} \times \frac{d^2 \vec{r}}{dt^2} \).

4. If \( \vec{a} = x^2i + xyj + y^2z \ k \), \( \vec{b} = yz^2i + xzj + x^2z \ k \) then find \( \text{grad} (\vec{a} \cdot \vec{b}) \).

5. Shown that the following vector functions are irrotational and find \( \phi, \vec{F} = \vec{F} = \frac{1}{r^2} \left[ r^2 \vec{a} + (\vec{a} \cdot \vec{r}) \vec{r} \right] \).

6. If \( \vec{F} = (y^2 - x^2 + 3yz - 2x)i + (3xz + 2xy)j + (3xy - 2xz + z)k \) show that \( \vec{F} \) is both solenoidal and irrotational.

7. Shown that the following scalar functions are irrotational and find corresponding scalar point function such that \( \vec{F} = \nabla \phi \) and verify \( \vec{F} = 2xyz \ i(x^2z + 2y)j + x^2yk \).

8. Find \( f(r) \) such that \( \nabla^2 f(r) = 0 \), where \( \vec{r} = +yj + zk \).

9. Show that the following vector functions are irrotational and find corresponding scalar point function such that \( \vec{F} = \nabla \phi \)
   \( \vec{F} = (y \sin z - \sin x)i + (x \sin z + 2yz)j + (xy \cos z + y^2)k \).

10. Show that the following vector functions are irrotational and find \( \phi, i f \)
    \( \vec{F} = \nabla \phi \) verify \( \vec{F} = f(r) \vec{r} \).

11. If \( \phi = 2xy^2z + x^2y \), evaluate \( \int_C \text{grad} \phi \cdot d\vec{r} \), where \( C \) is the curve \( x = t^0, y = t^2, z = t^3 \) from \( t = 0 \) to \( t = 1 \).

12. Show that the following vector functions are irrotational and find corresponding scalar point function such that \( \vec{F} = \nabla \phi \)
   \( \vec{F} = 2xyz^2i + (x^2z^2 \cos yz)j + (2x^2yz + y \cos yz)k \).

13. Show that the following vector functions are irrotational and find \( \phi, i f \)
    \( \vec{F} = \nabla \phi \) verify \( \vec{F} = f(\vec{a} \cdot \vec{r})\vec{a} \).
UNIT-IV

1. Solve the differential equations \((y + x^2y)\frac{dy}{dx} - (3x + xy^2) = 0\).

2. Find the equation of curve whose slope is \((x + 5)\) and passes through the point\((1,2)\).

3. Find the particular solution of differential equation \(\frac{dy}{dx} = e^{3x-y}\), when \(y=0, x=0\).

4. Solve the differential equation \((x + 1)dy + (y + 1)dx = 0\).

5. Form the differential equation, if \(J = A \cos 3x + B \sin 3x\).

6. Find the equation of curve whose slope at any point \((6x - 4)\) and it passes through point \((-1, 2)\).

7. Form the differential equation, if \(y = A \sin x + B \cos x\).

8. Find the equation of curve whose slope at any point \((x + 5)\) and it passes through point \((1, 2)\).

9. Solve the differential equation. \(\sin x \cos y \ dy + \sin y \cos x \ dx = 0\).

10. Solve the differential equation \(\frac{dy}{dx} = e^{3x-2y} + x^2. e^{-2y}\)

11. Solve the differential equation \(\sqrt{1-y^2} \ dx - \sqrt{1-x^2} \ dy = 0\)

12. Solve the differential equation \(y^2 \cos \sqrt{x} \ dx - 2\sqrt{x} \ e^\frac{1}{y} \ dy = 0\)
UNIT-V

1. Solve the linear differential equation \((D^2 + 2D + 2)y = e^{-x}sec^2 x\).

2. Solve the linear differential equation \((D^3 + 3D)y = \cosh 2x \cdot \sinh 2x\).

3. Solve \((D^2 + 3D + 2)y = x \sin 2x\).

4. Solve: \((D^2 + 1)y = \cos x\).

5. Solve the following: \((D^3 - 7D - 6)y = e^{2x}(x + 1)\).

6. Solve the linear differential equation, \((D^2 + 4D + 4)y = 2^x\).

7. Solve : \((D^2 - D - 2)y = 2 \log x + \frac{1}{x} + \frac{1}{\sqrt{x}}\).

8. Solve : \(\frac{d^2y}{dx^2} - 4 \frac{dy}{dx} - 5y = xe^{-x}\).

9. Solve the linear differential equation : \((D^3 - 5D^2 + 8D - 4)y = e^{2x} + 2e^x + 3e^{-x} + 2\)

10. Solve: \((D^2 + 5D + 6)y = e^{-2x}sec^2 x(1 + 2 \tan x)\).

11. Solve the linear differential equation, \(\frac{d^2y}{dx^2} + y = \cos 2x\).

12. Solve: \((D^2 - 4)y = x^2 e^{3x}\).
1. Find \( n^{th} \) derivative of: \( e^x \cos(3x + 1) \).

2. If \( y = e^{ax} \cos x \sin x \), then prove that 
\[
y_n = \frac{1}{2} e^{ax} (a^2 + 4)^{n/2} \left[ \sin(2x + n \tan^{-1} \frac{2}{a}) \right]
\]

3. If \( y = \log(2x + 5) \), then find \( y_n \).

4. If \( y = a \sin px + b \cos px \); then prove that \( y_2 + p^2 y = 0 \)

5. If \( y = a \cos(\log x) + b \sin(\log x) \); then prove that \( x^2 y_2 + xy_1 + y = 0 \)

6. If \( f(x) = x^5 \), prove that, \( f(1) + \frac{f'(1)}{1!} + \frac{f''(1)}{2!} + \frac{f'''(1)}{3!} + \frac{f^{(4)}(1)}{4!} + \frac{f^{(5)}(1)}{5!} = 32 \)

7. Find the \( n^{th} \) derivative of \( \frac{1}{(x-1)(x-2)(x-3)} \).

8. Find the \( n^{th} \) derivative of \( x^2 e^{3x} \).

9. Find the \( n^{th} \) derivative of \( y = x^2 \cos x \) by using Leibnitz theorem.

10. If \( y = (\sin^{-1} x)^2 \), then prove that, \((1 - x^2)y_2 - xy_1 - 2 = 0 \) and \((1 - x^2)y_{n+2} - (2n + 1)xy_{n+1} - n^2 y_n = 0 \)

11. If \( u = f \left( \frac{y}{x} \right) + \sqrt{x^2 + y^2} \) find the value of \( x \frac{du}{dx} + y \frac{du}{dy} \).

12. Verify the Cauchy's mean value theorem for \( f(x) = \frac{1}{x^2} \) and \( g(x) = \frac{1}{x} \) in \([a, b], a > 0 \). Show that the point \( c \) is harmonic mean of \( a \) and \( b \).

13. A balloon is in the form of right circular cylinder of radius 1.5m and length 4m is surrounded by hemispherical ends. If the radius is increased by 0.01m and the length by 0.05m, find the percentage change in the volume of the balloon.

14. Verify the Cauchy's mean value theorem for \( f(x) = x^2 \) and \( g(x) = x^3 \) in \([1, 2] \).
15. If \( u = x^2 - y^2 \), \( v = 2xy \) and \( V = f(u, v) \) then show that
\[
\frac{dV}{dx} - y \frac{dV}{dx} = 2(u^2 - v^2)^{1/2} \frac{dV}{du}
\]

16. At a distance of 20m from the foot of a tower the elevation of its top is 60 degree, if the possible error is measuring distance and elevation are 1 cm and 1 min, find the approximate error in the calculated height.

17. Considering the functions \( f(x) = \sqrt{x} \) and \( g(x) = \frac{1}{x} \) prove that ‘c’ of Cauchy’s mean value theorem is the geometric between a and b.

18. Using LMVT, Show that \( 1 - \frac{a}{b} < \log \frac{b}{a} < \frac{b}{a} - 1 \); for \( 0 < a < b \).
FUNDAMENTALS OF DIGITAL COMPUTING
SUBJECT: Fundamentals of Digital Computing

UNIT – I
Data and Information: Features of Digital Systems, Number Systems: Decimal, Binary, Octal, Hexadecimal & their inter conversions, Representation of Data: Signed Magnitude, one’s complement & two’s complement, Binary Arithmetic, Fixed point representation and Floating point representation of numbers.

Codes: BCD, XS-3, Gray code, hamming code, alphanumeric codes (ASCII, EBCDIC, UNICODE), Error detecting and error correcting codes.

UNIT- II
Boolean Algebra: Basic gates (AND, OR, NOT gates), Universal gates (NAND and NOR gates), other gates (XOR, XNOR gates). Boolean identities, De Morgan Laws.

Karnaugh maps: SOP and POS forms, Quine McClusky method.

UNIT -III
Combinational Circuits:
Half adder, full adder, code converters, combinational circuit design, Multiplexers and demultiplexers, encoders, decoders, Combinational design using mux and demux.

UNIT - IV
Sequential Circuit Design:
Flip flops (RS, Clocked RS, D, JK, JK Master Slave, T, Counters, Shift registers and their types, Counters: Synchronous and Asynchronous counters.

UNIT- V

UNIT -VI
Operating Systems:
Types (real Time, Single User / Single Tasking, Single user / Multi tasking, Multi user / Multi tasking, GUI based OS. Overview of desktop operating systems-Windows and LINUX.
UNIT I

1. Define the following terms:
   i) Bit  ii) Nibble  iii) Byte  iv) Word  v) Radix

2. Convert the following number into equivalent binary numbers:
   i) 96.25  ii) 135

3. State the rules of binary addition and subtraction and apply that on the following operations:

   \[(10111)_2 + (11001)_2\]
   \[(11011)_2 - (10110)_2\]

4. Perform the subtraction using 2's complement:
   \[(11011011)_2\] from
   \[(0101010)_2\]

5. Perform the subtraction \((A-B)\) using 1's complement:
   \(A=(11001100)_2\)
   \(B=(10110100)_2\)

6. Perform the following binary multiplication:
   \[101.11 \times 111.01\]

7. Perform the division of \(A\) by \(B\):
   \(A=(110110)_2\)
   \(B=(101)_2\)

8. i) Convert \((204)_{10}\) into its equivalent octal system.
   ii) Convert \((2003.31)_{10}\) into its equivalent hex system.

9. Obtain the XS-3 code for \((428)_{10}\)

10. Convert the following:
    i) 1010 gray to binary
    ii) 1011 binary to gray

11. Write the ASCII code for word 'SIWS' using even parity?
12. How does the error detection is possible with a parity with a parity checking method

13. When does error detection parity checking method fail to detect errors? Explain with an example.

14. A seven bit Hamming code is received as 1110101. What is the correct code? Assume the parity to be even.
UNIT II


2. Verify the following laws using truth table:
   i) \( A \ (B+C) = (A \ B) + (A \ C) \)
   ii) \((A \ B) \ C = A \ (B \ C)\)

3. State and implement AND laws using basic gates.

4. State and implement OR laws using basic gates.

5. Draw the logic circuit using the basic gates to obtain the following outputs:
   i) \( Y = (A \ B) + C \)
   ii) \( Y = AB + BC + AB \)

6. Prove that:
   i) \((A + B + AB) \ (A + B) \ (A \ B) = 0 \)
   ii) \((B + BC) \ (B + BC) \ (B + D) = B \)

7. Draw a timing diagram, pin diagram, symbol and truth table for 2 inputs AND gate and write

8. Justify the following statement:
   "NAND gate is called as Universal Gate".

9. Specify the symbol and write the truth table of EX-OR gate and EX-NOR gate.

10. Realize the following expression using only NOR gate:
    \( y = (ABC + BC) \ C \)

11. Convert the expression \( Y = AB + AC + BC \) into the canonical
    SOP form.

12. Convert the expression \( Y = (A + B) \ (A + C) \ (B + C) \) into canonical POS form.
13. Write the logic expression in canonical POS form for the truth table given below:

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

14. Write the logic expression in canonical SOP form for the truth table given below:

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

15. Draw the K-map and obtain the simplified logical expression for below expression:
   i) \( Y = m_1 + m_5 + m_7 + m_9 + m_{11} + m_{13} + m_{15} \)
   ii) \( Y = m_1 + m_3 + m_5 + m_9 + m_{11} + m_{13} \)
   iii) \( Y = m_0 + m_1 + m_3 + m_4 + m_5 \)
UNIT IV

1. Draw and explain sequential circuit.
2. State and explain the triggering methods used for flip-flops.
3. Explain with truth table, the working of clocked RS flip-flop.
4. State the disadvantages of RS flip-flop. How can they be avoided?
5. Explain with diagram the working of D-type flip-flop along with truth table.
6. Draw the symbol, truth table and circuit of T-type flip-flop.
7. Explain and draw SR flip-flop using NAND gate.
8. What is race around condition? How race around condition is avoided using master slave J-K flip-flop?
9. Explain with diagram the working master-slave J-K flip-flop.
10. Discuss in brief: 'race around condition in J-K flip-flop'.
11. What is the function of preset and clear inputs in flip-flop?
12. Explain the operation of 4-bit left shift register along with its diagram, truth table and timing diagram.
13. Explain the operation of 4-bit Serial-in-serial-out register along with its timing diagram, truth table and timing diagram.
14. Explain the operation of 4-bit Serial-in-parallel-out register along with its diagram, truth table and timing diagram.
15. Explain the operation of 4-bit parallel-in-Serial-out register along with its diagram, truth table and timing diagram.
16. What is counter? Explain the terms 'synchronous' and 'asynchronous'.
UNIT V

1. Enlist and explain the memory based on principle of operation.

2. Explain the internal block diagram of a digital computer system.

3. Enlist and explain the memory based on physical characteristics.

4. Explain the working of Hard Disk.

5. State the types of mouse and explain the working of optical mouse.

6. How does the data store on optical disk?

7. Explain the role of cache memory in CPU processing.

8. Write in brief: 'construction of keyboard'

9. Enlist the disadvantages of CRT.

10. Enlist the advantages of LCD.

UNIT VI

1. Explain in details real time operating system.

2. What is meant by single user single task operating system?

3. Discuss in details multiuser multitasking operating system?

4. Write short note on windows operating system and enlist the different available versions of it

5. Write the advantages of LINUX operating system.

6. How LINUX is different than windows operating system.

7. Why the scheduling is important in real time operating system?

8. Explain the concept of user mode and kernel mode in operating system.

9. Write short note on round robin scheduling.

10. What is the need of binary semaphore in real time operating system.
ELECTRONICS
AND
COMMUNICATION
TECHNOLOGY
SUBJECT: Electronics and Communication Technology

UNIT-I
Concept of Conductor, Semiconductor, Insulator. Semiconductor Diode, Forward bias, Reverse Bias, Application of Diode as Rectifier, Zener diode and its applications, Introduction to Transistor (BJT, FET), PNP, NPN Transistors their Characteristic. Application of Transistor as amplifier and as a Switch.

Unit-II

Unit-III
Concept of Feedback:- Negative Feedback and its advantage in Amplification, Positive Feedback :- Oscillators, RC Phase Shift Oscillator, LC Oscillator. Switching Circuits Multivibrators : - Monostable using IC 555 and Astable using IC 555 (including problems)

Unit- IV

Unit- V

Unit-VI
UNIT- I

Q.1] Write the difference between conductor, semiconductor and insulator.
Q.2] Describe the classification of semiconductor.
Q.3] Explain the crystal structure of semiconductor.
Q.5] Explain formation of n- type semiconductor.
Q.6] Describe the formation of pn junction diode.
Q.7] Describe the biasing of pn junction diode.
Q.9] Explain the V-I characteristics of diode.
Q.10] Explain Half wave rectifier in detail.
Q.12] Explain Full wave rectifier in detail.
Q.13] Write the difference between half wave, full wave and bridge rectifier.
Q.14] Explain Wenneer diode.
Q.15] Write the difference between Wenneer and pn junction diode.
Q.16] Describe the construction of transistor.
Q.17] Describe the V-I characteristics of common emitter transistor.
Q.18] Describe the construction of FET.
Q.19] Write the difference between BJT and FET.
UNIT-II

Q.1] Explain the concept of amplification?
Q.2] Give the characteristics of amplifier.
Q.3] Explain single stage amplifier.
Q.4] Explain the concept of frequency response and bandwidth.
Q.5] What is cascading and explain the need of it.
Q.8] Explain the Darlington pair amplifier.
Q.10] Explain the RC coupled amplifier.
UNIT-III

Q.1] Explain the concept of FEEDBACK.
Q.7] Explain LC oscillator.
Q.8] Explain Hartly oscillator.
Q.9] Explain Colpit’s oscillator.
Q.12] Give advantages, disadvantages and application of Colpit’s oscillator.
Q.13] Write the difference between RC and LC oscillator.
Q.14] Write the difference between Hartly and Colpit’s oscillator.
Q.16] Draw the pin diagram of 555 timer and explain it.
Q.17] Explain Monostable multivibrator.
Q.19] Write the difference between oscillator and multivibrator.
UNIT - IV

Q.1] With the help of block diagram explain communication system.
Q.2] What is modulation? What is the Need of it?
Q.3] Give the classification of Modulation technique.
Q.5] Explain Frequency modulation.
Q.7] Explain High level collector modulator.
Q.9] Give advantages, disadvantages and application of AM.
Q.10] Give advantages, disadvantages and application of FM.
Q.14] With the help of block diagram explain pilot carrier SSB system.
Q.1] Describe the frequency spectrum of FM wave.
Q.2] Write the difference between wide band FM and narrow band FM.
Q.3] Write the difference between AM and FM.
Q.4] Write the difference between AM and PM.
Q.5] Explain the concept of Pre emphasis and De-emphasis.
Q.7] With the help of block diagram explain Superhyterodyne AM receiver.
Q.8] With the help of block diagram explain FM receiver.
Q.9] Explain the sampling process.
Q.10] Explain the generation of PAM.
Q.11] Explain the quantization process.
Q.13] What are the common features of TV system?
Q.14] With the help of block diagram explain Television receiver.
Q.15] With the help of block diagram explain Television transmitter.
Q.16] Explain the scanning process.
Q.17] What is Additive and Subtractive colour system?
UNIT – VI

Q.1] Describe the construction of optical fiber.
Q.3] With the help of block diagram explain optical communication system.
Q.4] With the help of block diagram explain optical fiber transmission system.
Q.5] What are the different types of rays used in optical fiber communication system.
Q.8] Give advantages, disadvantages and application of LED.
Q.10] Explain p-i-n photodiode.
Q.11] What are the advantages of fiber optical communication.
Q.12] What are the different modes of propagation.
Q.13] Explain the losses due to Absorption.
INTRODUCTION TO C++ PROGRAMMING
**SUBJECT:** Introduction to C++ Programming

**Unit –I**


**Unit-II**

**C++ concepts** : Variables and Assignments: variables, identifiers, variable declarations, Assignment Statements, reference variable, symbolic constant, Input and Output: cin, cout, escape sequences, include directives and Namespaces, Indenting and Comments, Operator precedence, Data types and expressions, Arithmetic operators, Type compatibilities.

**Unit-III**

**Flow of Control** : Compound statements, Loops: while, for, do while, nested loops, Decision making: if – else, nested if else, switch , break and continue, Manipulators: endl, setw, sizeof, Increment and decrement operators, Type Cast Operators, Scope resolution operators

**Unit-IV**

**Functions** : Function Prototypes, built in functions and user defined functions, Function overloading, Call by reference, Call by value, const member functions, Inline Functions and recursive functions, Math Library Functions.

**Unit-V**

**Derived Data types (Arrays, pointers, functions)** : Introduction to arrays, arrays in functions, 2-D arrays, Multidimensional arrays, Introduction to pointers, void pointers, pointers in function, pointer to constant and constant pointer, generic pointer.

**Unit-VI**

UNIT I

1. Write an algorithm to find out smallest number out of 4 numbers

2. Write an algorithm to solve the following series:
   \[1 - x + x^2 - x^3 \ldots \ldots x^n\]

3. Draw a flow chart to check whether the given number is positive or negative.

4. Draw a flow chart to find out the largest number out of three numbers.

5. Write an algorithm to find out the factorial of a given number.

6. Write an algorithm to solve the following series:
   \[e^x = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \ldots \frac{x^n}{n!}\]

7. Draw a flow chart for reversing the digits of an integer.

8. Write an algorithm to generate prime numbers.

9. Write an algorithm to print Fibonacci series.

10. Explain the structure of C++ program.

11. Describe the steps for compiling C++ programs.

12. Draw a flow chart that will read the value of x and evaluate the following function:
    \[y = \begin{cases} 
    1 & \text{for } x > 0 \\
    0 & \text{for } x = 0 \\
    -1 & \text{for } x < 0 
    \end{cases}\]

13. Write an algorithm to get the number 'n' and display the corresponding day of the week.

14. Explain the steps to compile & execute a C++ program.

15. Draw a flow chart to read an integer value and check whether the given number is odd or even.

16. Describe the structure of C++ program.
17. Draw a flow chart to check whether the given year is leap year or not.

18. Electricity charges are computed as follows:

<table>
<thead>
<tr>
<th>Units Consumed</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>First 100 unit</td>
<td>Min Rs. 50/-</td>
</tr>
<tr>
<td>Next 500 unit</td>
<td>70 paise per unit</td>
</tr>
<tr>
<td>Next 1000 unit</td>
<td>80 paise per unit</td>
</tr>
<tr>
<td>Excess</td>
<td>90 paise per unit</td>
</tr>
</tbody>
</table>

If the bill amount exceeds Rs.1000 a sub charge of 10% of amount exceeding Rs.1000 is added to the bill amount. Write an algorithm to input consumer number and units consumed and then print consumer number, units consumed and bill amount.

19. Admission to a professional course is subject to the following conditions:
- Marks in Mathematics >=60
- Marks in Physics >=50
- Marks in Chemistry >= 40
- Total in all three subjects >=200

Write an algorithm to process the applications to list the eligible candidates.

20. Describe the design of C++ program.
UNIT II

1. Explain the keywords.

2. Describe all arithmetic operators.

3. Explain all logical operators.

4. Describe all assignment operators.

5. What is type casting? How is it done?

6. What is the difference between a++ and ++a

7. Explain the operator precedence rule.

8. List out the unary operators.

9. Why are we including header files? List some header files for its purpose.

10. Describe the use of stream operators.

11. Explain in detail about include directives and new spaces.

12. The distance between two cities (in k.m) is input through the Keyboard. Write a C++ program to convert and print this distance in meters, feet, inches, and centimeters.

13. List out at least 5 categories of operators used in C.


15. Write a C++ program to convert feet into inches.

16. List out the different assignment operators of C++ with the proper example statements.

17. Write a C++ program to get these values from the user and display the prices as follows:

<table>
<thead>
<tr>
<th>List of Items</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>Price</td>
</tr>
<tr>
<td>Book</td>
<td>Rs.30</td>
</tr>
<tr>
<td>Notebook</td>
<td>Rs.20</td>
</tr>
</tbody>
</table>
18. Differentiate Variable and Reference Variable.

19. Give an example C++ program for that.

20. Write a C++ program to input lengths of three sides of triangle and then print its area. Where \((a, b, c\) are sides)

\[
S = \frac{(a+b+c)}{2}
\]

\[
\text{Area} = \sqrt{s(s-a)(s-b)(s-c)}
\]
UNIT III

1. Explain the syntax for ‘For’ statement.
2. How the statement ‘while’ and ‘do…..while’ differ?
3. How is ‘switch’ statement used for decision making?
4. Describe the syntax of all different ‘if’ statements with example.
5. Differentiate scope resolution operator and type cast operator.
6. Explain setw and endl manipulators with example.
7. Explain increment and decrement operators with example.
8. Write a program to calculate the electricity charges.
9. Write a program to calculate the hour basis wages for the workers
10. Write a program to check the sum of all integers that are divisible by 7 and not by 17 from 50 to 100.
11. Write a program to calculate the factorial of a number.
12. Write a program to get two numbers and to check whether first number is divisible by other number or not.
13. Write a program to generate Fibonacci series.
14. Write a program to find the day name corresponding to week day.
15. Write a program to display the grade of a student.
16. Write a program to check whether the given number is Armstrong or not.
17. Write a program to check whether the given number is prime or not.
18. Write a program to display prime series.
19. Write a program to display multiplication table of a given number.
20. Write a program to find the sum of the digits of a number.
21. Write a program to check whether the given number is perfect or not.
22. Wages of workers are to be calculated as follows:

<table>
<thead>
<tr>
<th>Category</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Per Hour Salary</td>
<td>100</td>
<td>80</td>
<td>60</td>
<td>40</td>
</tr>
</tbody>
</table>

Input the worker no., category and hours worked. Calculate and print the wages.

23. Write a program to print the sum of all odd numbers from 75 to 225 which are divisible by 9 but not divisible by 13.

24. Write a program to display the prime numbers from 1 to 100.
UNIT IV

1. Define function. Explain the syntax for using the function.
2. Explain all different function prototypes.
3. Describe the concept of function overloading.
4. Differentiate Call by Value and Call by Reference.
5. Differentiate inline functions and recursive functions.
6. List the math library functions
7. Differentiate built in functions and user defined functions.
9. Write a C++ program to overload a function for calculating the area of a square, rectangle and circle.
10. Write a C++ program to calculate 1+2!+3!+.....Use factorial function to calculate factorial.

11. List math library functions in C++ with its syntax and purpose.
12. Write a C++ program to print the factorial of a number.
    Use recursive function.
13. Write a C++ program to read two numbers and find their sum,average and difference by using function.
14. Differentiate Call by Value and Call by Reference of function with an C++ example.
15. Write a C++ program to find the sum of 1!+2!+3!+.....n!.
    Use function for finding factorial.
16. Write a C++ program to overload a function for finding the area of Square,Circle and Rectangle.
17. Differentiate **built in** functions and **user defined** functions with an C++ example.
18. Write separate functions to calculate area,circumference of a circle,square & rectangle.
19. Write a function to find square root of a number. Calculate $\sqrt{1+\sqrt{2+\sqrt{3+\ldots}}}$
20. Write a C++ program to display the Fibonacci series. Use recursive function.
1. Differentiate **void pointer** and **generic pointer** in C++.
2. Write a C++ program to find the number of zeroes in an array.
3. Write a C++ program to find the trace of a square matrix.
   [Trace is sum of all diagonal elements of a matrix.]
4. Differentiate **const pointer** and **pointer to const** in C++.
5. Write a program to read N numbers and find the occurrence of value X.
6. Write a C++ program to check the given matrix is upper triangular or not.
7. Write a C++ program to find the number of zeros, in a nxn matrix.
8. Write a C++ program to read N numbers and find the sum of all elements in an array.
9. How can you call a function by using pointer in C++?
10. Write a program to accept 100 elements in the array and find the average of that.
11. Write a program to accept matrix and find out the inverse of that matrix.
12. What is a pointer? How are they declared and initialized.
13. What is the difference between “*” and “&” according to pointer concept.
14. Explain the concept of constant pointer.
15. How do we initialize and declare an array.
16. Write a C++ program to find the transpose of a matrix.
17. Write a C++ program to add two matrices.
18. Write a C++ program to multiply two matrices.
19. Write a C++ program to swap two values by using call by value concept.
20. Write a C++ program to swap two values by using call by reference concept.
1. Define Vector in a C++ program. Give one example for that.
2. Define a structure called employee which has the parameters emp_id, e_name and sal. Get n employees details and display the employees list with their annual income.
3. List all String functions with an example.
4. Define a structure called stud in C++ which has the parameters roll_no, name & marks. Get n students details and display the student’s list.
5. Write a C++ program to read a string and find the reverse of the string. Also check that the string is palindrome or not.
6. Write a C++ program to read 10 names and display them with the number of characters in each name.
7. Write a C++ program to use vector for sorting 'n' numbers in ascending Order.
8. Accept Basic pay, DA, TA, HRA of n employee and calculate the salary of employees.
9. Write a program to calculate average marks of the students where student has three subjects.
10. Write a program to find out whether given time is valid or not.
11. Explain push_back() function in short.
12. Write a program to to accept a character and find out whether it is capital or lower alphabet or digit or special character or vowel
13. Use vector to sort an array of numbers.
14. Use vector to find the smallest element of an array.
15. How to enter the input for the non initialized array?
16. Write a C++ program to concatenate two strings without using built-in functions.
17. Write a C++ program to copy two strings without using built-in functions.
18. Write a C++ program to reverse two strings without using built-in functions.
19. Write a C++ program to find the length of strings without using built-in functions.
20. How can you use vector to accept a string as a input.