

**Code: 19AC21T**

I B.Tech. II Semester Supplementary Examinations March 2021

**Differential Equations and Vector Calculus**

( Common to All Branches )

Max. Marks: 70

Time: 3 Hours

Answer all five units by choosing one question from each unit ( 5 x 14 = 70 Marks )

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Marks

## UNIT-I

1. a) Solve  $\frac{d^2 y}{dx^2} - 3\frac{dy}{dx} + 2y = xe^{3x} + \sin 2x$  7M

b) Solve  $\frac{d^2 y}{dx^2} - 2\frac{dy}{dx} + y = xe^x \sin x$  7M

OR

2. Using method of variation of parameters, solve

$$\frac{d^2 y}{dx^2} + y = x \sin x$$
 14M

## UNIT-II

3. Solve  $(2x+3)^2 \frac{d^2 y}{dx^2} - (2x+3) \frac{dy}{dx} - 12y = 6x$  14M

OR

4. An uncharged condenser of capacity C is charged by applying an e.m.f.  $\frac{E \sin t}{\sqrt{LC}}$ , through leads of self-inductance L and negligible resistance. Prove that at any time t, the charge on one of the plates is  $\frac{EC}{2} \left\{ \sin \frac{t}{\sqrt{LC}} - \frac{t}{\sqrt{LC}} \cos \frac{t}{\sqrt{LC}} \right\}$ . 14M

## UNIT-III

5. a) Form the partial differential equation by eliminating the arbitrary constants a, b and c from  $(x-a)^2 + (y-b)^2 + z^2 = c^2$  7Mb) Solve  $2xz - px^2 - 2qxy + pq = 0$  by Charpit's method. 7M

OR

6. a) Form the partial differential equation by eliminating the arbitrary function f from  $z = y^2 + 2f\left(\frac{1}{x} + \log y\right)$  7Mb) Solve by the method of separation of variables  $\frac{\partial u}{\partial x} = 4 \frac{\partial u}{\partial y}$ , given that  $u(0, y) = 8e^{-3y}$ . 7M

## UNIT-IV

7. Prove that  $\nabla^2(r^n) = n(n+1)r^{n-2}$  14M

OR

8. a) What is the directional derivative of  $W = xy^2 + yz^3$  at the point (2, -1, 1) in the direction of the normal to the surface  $x \log z - y^2 = -4$  at (-1, 2, 1). 7Mb) Find the work done in moving a particle in the force field  $\vec{F} = 3x^2 \vec{i} + (2xz - y) \vec{j} + z \vec{k}$ , along the straight line from (0,0,0) to (2,1,3). 7M

## UNIT-V

9. Verify Green's theorem for  $\int_C (x^2 y dx + x^2 dy)$  where C is the boundary described counter clockwise of triangle with vertices (0, 0), (1, 0), (1, 1). 14M

OR

10. Verify Stoke's theorem for the vector field  $\vec{F} = (2x - y) \vec{i} - yz^2 \vec{j} - y^2 z \vec{k}$  over the upper half surface of  $x^2 + y^2 + z^2 = 1$ , bounded by its projection on the xy-plane. 14M

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Hall Ticket Number :

R-19

Code: 19A421T

I B.Tech. II Semester Supplementary Examinations March 2021

**Electronic Devices and Circuits**

( Common to EEE &amp; ECE )

Max. Marks: 70

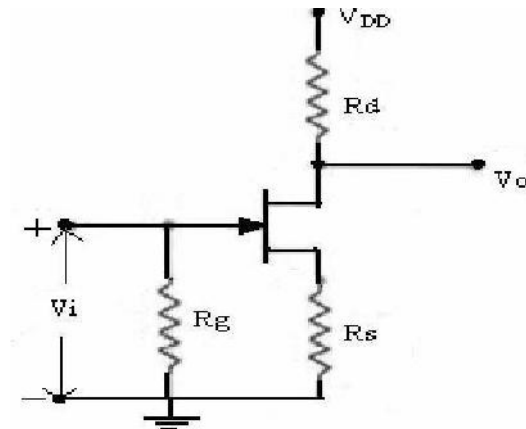
Time: 3 Hours

Answer all five units by choosing one question from each unit ( 5 x 14 = 70 Marks )

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	Marks	CO	Blooms Level
<b>UNIT-I</b>			
1. a) <b>Draw</b> the self-bias circuit and obtain the expression for the stability factor. Discuss the advantages and disadvantages of self-biasing?	7M	CO1	L2
b) <b>Justify</b> statement "Potential divider bias is the most commonly used biasing method" for BJT circuits. Explain how bias compensation can be done in such biasing through diodes?	7M	CO1	L2
<b>OR</b>			
2. a) <b>Define</b> Thermal Runaway" in transistors? Derive the condition to prevent Thermal Runaway" in Bipolar Junction Transistors?	7M	CO1	L1, L3
b) <b>Design</b> an Emitter bias circuit using silicon transistor to achieve a stability factor of 20, with the following specifications: $V_{CC} = 16V$ , $V_{BE} = 0.7V$ , $V_{CEQ} = 8V$ , $I_{CQ} = 4 \text{ mA}$ & $\beta = 50$ .	7M	CO1	L3
<b>UNIT-II</b>			
3. a) With the help of neat sketches and characteristic curves <b>explain</b> the construction & operation of a JFET and mark the regions of operation on the characteristics?	8M	CO2	L2
b) The P-channel FET has a $ I_{DS}  = -12\text{mA}$ , $ V_p  = 5V$ , $V_{GS}$ is 1.6 V. <b>Determine</b> $I_D$ , $G_m$ and $G_{m0}$ ?	6M	CO2	L3
<b>OR</b>			
4. a) <b>Explain</b> the construction & operation of a P-channel MOSFET in enhancement and depletion modes with the help of static drain characteristics and transfer characteristics?	7M	CO2	L2
b) A self-biased p – channel JFET has a pinch – off voltage of $V_P = 5 \text{ V}$ and $I_{DSS} = 12 \text{ mA}$ . The supply voltage is 12 V. <b>Determine</b> the values of $R_D$ and $R_S$ so that $I_D = 5 \text{ mA}$ and $V_{DS} = 6V$ ?	7M	CO2	L3
<b>UNIT-III</b>			
5. a) <b>Explain</b> ac and dc load lines. What is the <b>significance</b> of Q-point.	7M	CO3	L2
b) <b>What</b> is ac emitter resistance? <b>Derive</b> voltage gain in terms of ac emitter resistance.	7M	CO3	L2
<b>OR</b>			
6. a) <b>Define</b> Amplifier? <b>Outline</b> the classification of amplifiers in detail?	7M	CO3	L1, L4
b) <b>Explain</b> the importance of the input impedance of an amplifier.	7M	CO3	L2
<b>UNIT-IV</b>			
7. a) <b>Describe</b> is the effect of external source resistance on the voltage gain of a common source amplifier? Explain with necessary derivations?	7M	CO4	L2
b) <b>Explain</b> the principle of CS amplifier with the help of circuit diagram. Derive the expressions for $A_v$ , input impedance and output Impedance?	7M	CO4	L2
<b>OR</b>			

8. a) A Common Source FET amplifier circuit shown in Figure.2 with unbypassed  $R_S$  has the following circuit parameters:  $R_d = 15K$ ,  $R_S = 0.5K$ ,  $R_g = 1M$ ,  $r_d = 5K$ ,  $g_m = 5mS$  and  $V_{DD} = 20 V$ . Find  $A_V$ ,  $A_i$ ,  $R_i$  and  $R_o$ ?



7M CO4 L3

- b) Draw the small-signal model of common source FET amplifier. Derive expressions for voltage gain and output resistance?

7M CO4 L3

UNIT-V

9. a) Write short notes on  
 (i) Varactor diode (ii) Photo transistor
- b) Draw the symbol and explain the construction of SCR and explain its operation with characteristics

8M CO5 L2

6M CO5 L2

## OR

10. a) Write short notes on  
 (i) LED (ii) UJT
- b) Explain the operation and characteristics of Schottky diode.

8M CO5 L2

6M CO5 L2

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Code: 19AC24T

I B.Tech. II Semester Supplementary Examinations March 2021

**Engineering Chemistry**

( Common to EEE &amp; ECE )

Max. Marks: 70

Time: 3 Hours

Answer all five units by choosing one question from each unit ( 5 x 14 = 70 Marks )

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	Marks	CO	Blooms Level
<b>UNIT-I</b>			
1. a) Explain the origin of single electrode potential and derive an expression for single electrode potential	7M	CO1	L2
b) Classify the following cells into chemical cell, concentration cell (electrode or electrolyte) with or without transference: (i) $H_2 (P_{H_2})   H_2SO_{4(aq)}, Hg_2SO_{4(s)}   Hg$ (ii) $Zn(Hg) (a_1)   Zn^{2+} (a_{Zn^{2+}})   Zn(Hg) (a_2)$ (iii) $H_2 (g, 1 atm)   HCl (a_1)   HCl (a_2)   H_2 (g, 1 atm)$	7M	CO1	L4
<b>OR</b>			
2. a) What are reference electrodes? How do you construct hydrogen electrode? Write its half-cell reaction, advantages and disadvantages.	7M	CO1	L3
b) (i) How can you differentiate the concentration cell from galvanic cell? (ii) What is half-cell reaction? Write half-cell reactions for metal-metal ion electrode and metal-metal insoluble salt electrodes with suitable examples.	7M	CO1	L3
<b>UNIT-II</b>			
3. a) Discuss the chemistry and working principle of a lithium-MnO <sub>2</sub> cell	7M	CO2	L3
b) List out the characteristics of good battery and explain any three of them in detail	7M	CO2	L2
<b>OR</b>			
4. a) Explain the construction and working of propane and oxygen fuel cell	7M	CO2	L3
b) What is meant by fuel cell? How does it differ from a conventional galvanic cell? Write merits of fuel cell?	7M	CO2	L3
<b>UNIT-III</b>			
5. a) Explain the manufacturing of photovoltaic cells using vapour deposition technique	7M	CO3	L2
b) Discuss physical and chemical properties of silicon and comment on solar grade silicon	7M	CO3	L2
<b>OR</b>			
6. Explain the doping concept of a silicon semiconductor	14M	CO3	L2
<b>UNIT-IV</b>			
7. a) Write a short note with suitable examples on (i) Chain growth polymerization and (ii) Step growth polymerization	7M	CO4	L4
b) Discuss the functionality of monomers with good examples and how it is involved in the polymerization process.	7M	CO4	L3
<b>OR</b>			
8. a) Describe the synthesis and applications of polyaniline, a conducting polymer.	7M	CO4	L2
b) What is an elastomer? Discuss the preparation, main properties and uses of the following: (i) Bakelite and (ii) Buna-S	7M	CO4	L4
<b>UNIT-V</b>			
9. a) What is meant by nanoparticles? Write a note on carbon nano tubes (CNT) and nanowires.	7M	CO5	L3
b) Describe the working principle and applications of transition electron microscope (TEM)	7M	CO5	L2
<b>OR</b>			
10. a) What are molecular switches? Explain the applications of Rotaxanes and Catenanes to molecular switches.	7M	CO5	L3
b) Write a note on the following: (i) Cyclodextrin-based switches and (ii) Back and forth switching	7M	CO5	L2

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<b>R-19</b>
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**Code: 19AC26T**

I B.Tech. II Semester Supplementary Examinations March 2021

**Environmental Science**  
( Common to EEE & ECE )

Max. Marks: 70

Time: 3 Hours

Answer all five units by choosing one question from each unit ( 5 x 14 = 70 Marks )

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**UNIT-I**

- 1. a) List and explain the four conceptual spheres in the earth's environment. 7M
- b) Summarize the need for public awareness about environment. 7M

**OR**

- 2. Explain the scope and importance of environmental studies. 14M

**UNIT-II**

- 3. a) What are renewable and nonrenewable natural resources? Give examples. 7M
- b) Summarize the causes of deforestation. 7M

**OR**

- 4. a) Discuss the importance of land as a natural resource. 7M
- b) Explain the various effects of soil erosion. 7M

**UNIT-III**

- 5. a) Describe the components of an ecosystem. 7M
- b) Explain briefly the ex situ conservation of biodiversity. 7M

**OR**

- 6. a) With a neat sketch, explain how the element carbon is recycled in nature. 7M
- b) Discuss briefly the in situ conservation of biodiversity. 7M

**UNIT-IV**

- 7. a) List and explain the control measures of air pollution. 7M
- b) Identify and explain the human activities contributing to large scale water pollution. 7M

**OR**

- 8. a) Discuss in detail the control measures of noise pollution. 7M
- b) Describe the effects and control measures of water pollution. 7M

**UNIT-V**

- 9. a) Describe the causes of population explosion. 7M
- b) List the salient features of forest conservation act. 7M

**OR**

- 10. a) Summarize the salient features of air (prevention and control of pollution) act. 7M
- b) Explain the effects and control of AIDS. 7M

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<b>R-19</b>
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**Code: 19AC25T**

I B.Tech. II Semester Supplementary Examinations March 2021

**Functional English and Life Skills**

( Common to EEE & ECE )

Max. Marks: 70

Time: 3 Hours

Answer all five units by choosing one question from each unit ( 5 x 14 = 70 Marks )

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Marks	CO	Blooms Level
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**UNIT-I**

- |   |    |     |    |
|---|----|-----|----|
| 1. a) What is Hazlitt's advice, in his letter to his son, on health and the choice of a profession?   | 7M | CO1 | L2 |
| b) <b>Change the following statements into questions:</b><br>i. You don't want to play indoor games.<br>ii. She attended the party yesterday<br>iii. Ranya always thinks about her friends.   | 3M | CO3 | L4 |
| c) <b>Fill in the blanks with appropriate form (part of speech) of the underlined words:</b><br>i. <u>Attraction</u> is quite common for teenagers. They always want to _____ the opposite gender.<br>ii. Tharun is leading an ideal life. He never <u>insults</u> anyone. He controls himself if he faces any _____<br>iii. <u>Believe</u> in yourself. That _____ makes you great in your life and career.<br>iv. Symala's <u>behavior</u> is good. Her mother taught her how to ___ with others. | 4M | CO3 | L3 |

**OR**

- |  |    |     |    |
|--|----|-----|----|
| 2. a) 'If neither foes nor loving friends can hurt you' - What kind of ethical behaviour one should possess to achieve the above mentioned state in the present day society?   | 7M | CO2 | L2 |
| b) <b>Rearrange the following jumbled sentences in a correct sequence:</b><br>P. Then two astronomers—the German, Johannes Kepler, and the Italian, Galileo Galilei started publicly to support the Copernican theory, despite the fact that the orbits it predicted did not quite match the ones observed.<br>Q. His idea was that the sun was stationary at the centre and that the earth and the planets moved in circular orbits around the sun.<br>R. An idea / a simple model was proposed in 1514 by a Polish priest, Nicholas Copernicus.<br>S. Nearly a century passed before this idea was taken seriously | 4M | CO4 | L4 |
| c) Use the following words in your own sentences<br>i. Compute                      ii. Lately                      iii. origin  | 3M | CO3 | L3 |

**UNIT-II**

- |  |    |     |    |
|--|----|-----|----|
| 3. a) . Write the summary of Alfred Lord Tennyson's poem 'The Brook'   | 7M | CO1 | L1 |
| b) <b>Fill in the blanks with correct articles/zero article:</b><br>i. Ramanath is an Indian but his wife Katherina _____ European.<br>ii. Danush plays cricket very well. He is _____ Virat Kohli of our college. | 2M | CO3 | L3 |
| c) Write a paragraph in about 70 words on 'Self Discipline'.   | 5M | CO4 | L4 |

**OR**

- |  |    |     |    |
|--|----|-----|----|
| 4. a) How did GB Shaw, a Nobel Prize winner in literature, who was nervous to speak in public, transform himself into a great public speaker?  | 7M | CO2 | L2 |
| b) <b>Fill in the blanks with appropriate connectors/linkers:</b><br>i. After spending two months at home, the thought of returning to work is tiring. Obviously I don't want to go. _____, I have decided to go as I am in need of money.<br>ii. Ramesh is honest and kindhearted. He always wants to help the people around him. Many of his friends, classmates and neighbours got help from him. _____, his brother is a cruel man and he always has evil thoughts about others. | 2M | CO3 | L3 |
| c) Write a Paragraph in about 70 on 'Reading Books'  | 5M | CO4 | L4 |

## UNIT-III

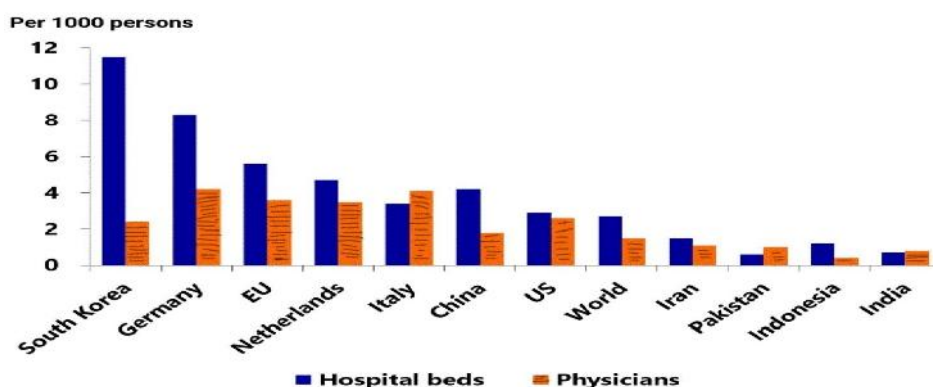
5. a) Sketch the character of Dr. Stronetz in Saki's play 'The Death Trap' 7M CO1 L2
- b) **Summarize the following text:**  
 The Olympic Games are one of the best examples which prove how sporting events can bring nations together, at least temporarily. From the ancient history, when Greeks and Romans would interrupt battles to participate in the games to the more recent international disputes, when athletes from Palestine and Israel would forget their differences, compete peacefully and even embrace each other after an event. Moreover, these popular events have called the world's attention to the terrible consequences of the wars and thus some leaders have tried to reach agreements to end their disputes and live peacefully. Similarly, international sporting events show benefits in some developing countries which live in a daily internal civil war. For example, Brazil has a high rate of unemployment, lack of education, hunger, crime, poverty and corruption which leads to an immense embarrassment of being Brazilian and a low self-esteem. However, when the Football World Cup starts, the Brazilian squad, which is considered the best team in the world, provokes an amazing feeling of pride in their country. Most people seem to forget all their problems and even the criminal activity decreases. They paint roads with the national colours, wear the Brazilian team shirts and buy national flags. Moreover, the competition brings families and neighbors together and even rival gangs watch the games and celebrate peacefully. In conclusion, popular sporting events play an important role in decreasing international tensions and liberating patriotic feelings as history has shown. 5M CO2 L4
- c) **Change the following sentences into Indirect Speech:**
- Rani said, 'She has applied for scholarship' 2M CO3 L2
  - My teacher says, 'health is wealth'

OR

6. a) 'Hold every hour in your grasp'- What exactly is the writer's view? Explain some time management tips. 7M CO2 L2
- b) **Fill in the blanks with the suitable form of the verb given in brackets:**
- He has forgotten his pen again. He always \_\_\_\_\_ (forget) his pen.
  - We were disappointed because the programme \_\_\_\_\_ (start) before we reached the venue.
  - My close friend who owns two big companies \_\_\_\_\_ (earn) one crore rupees per annum.
  - You rejected her love proposal. If I were you, I \_\_\_\_\_ (accept) her love without second thought. 4M CO3 L3
- c) **Choose the correct option from the brackets:**
- Neither my friend nor my classmates \_\_\_\_ (has/ have) supported me in this issue.
  - Samantha as well her co-actors \_\_\_\_\_ (is/are) coming to our village.
  - A number of poor people \_\_\_\_\_ (die/dies) every day due to lack of food. 3M CO3 L3

## UNIT-IV

7. a) How did Yellamma earn a special place with her artistic skills in 'Chindu Baghavatam'? 7M CO1 L2
- b) **Transfer the information into text:**  
 Health Facilities in different Countries



7M CO2 L2

OR

8. a) 'Innovative ideas are essential to success'- justify your answer with reference to Yunus Social Business. 7M CO2 L4
- b) **Mark the following comparisons true or false:**
- Kamala is the tallest of the two girls.
  - The climate of Bengaluru is better than Kadapa
  - India is one of the biggest democratic countries in the world. 3M CO3 L2
- c) **Give antonyms to the underlined words:**
- Nature is our mother. Nature heals us. We have a strong bond and emotional connection with nature. The serenity of nature calms our heart. Both the stillness and the movement in nature have a hypnotizing effect. The unfolding creativity of nature is an art. The practice of devoting ourselves to the bliss of nature is soothing and reviving. Nature always strengthens her children. 4M CO3 L3

## UNIT-V

9. a) What are the questions, according to George Orwell, a scrupulous writer asks himself in every sentence he writes? 7M CO1 L1
- b) **Correct the following sentences:**
- The doctor and the philosopher has been felicitated this morning.
  - If my father will permit, I will attend the function.
  - The students are learning English for two years
  - All the articles which has been placed on the table needs repair.
  - Teja prefers money than fame.
  - My father is a MP and my elder sister is an MLA.
  - Rao's father congratulated him for his success. 7M CO3 L3

OR

10. a) Narrate Mrunalini Sarabai's motivated life story. 7M CO1 L1
- b) Write an Essay in about 150 words on the topic 'The social Responsibilities of Multinational Companies' using the following claims.
- Earning money should not be the sole aim of the companies- they can hold the entire nation's political power in their grip – they themselves should be ready to take up socially benefited schemes- they need to give something back to the society- smile on the lips of the people should be the goal of MNCs. 7M CO4 L5

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Hall Ticket Number :

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**R-19**

**Code: 19A522T**

I B.Tech. II Semester Supplementary Examinations March 2021

## **Programming through Python**

( Common to EEE & ECE )

Max. Marks: 70

Time: 3 Hours

Answer all five units by choosing one question from each unit ( 5 x 14 = 70 Marks )

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Marks CO Blooms Level

### **UNIT-I**

1. Examine the various control structures in python with suitable examples 14M CO1 L3

**OR**

2. a) Describe the following operation in tuples,  
i) Maxima ii) Minima iii) Sum of two tuples iv) Duplicate a tuple  
v) Slicing operator 7M CO1 L1  
b) Show how an input and output function is performed in python with an example. 7M CO1 L1

### **UNIT-II**

3. a) Describe the syntax and rules involved in the return statement in python 7M CO2 L1  
b) What is the major advantage and disadvantages of sets over lists? Describe a Python program to demonstrate differences between normal and frozen set 7M CO2 L1

**OR**

4. Examine the following a) Creating the List b) Accessing values in the Lists  
c) Updating the Lists d) Deleting the list Elements 14M CO2 L3

### **UNIT-III**

5. a) How to access characters of a string? 7M CO3 L3  
b) Define file handling. Illustrate with an example of closing a file. 7M CO3 L3

**OR**

6. a) Examine the importance of user – defined Exceptions 7M CO3 L3  
b) Write a python program for reading text from a file 7M CO3 L3

### **UNIT-IV**

7. a) Show the importance of encapsulation in python. Explain with example. 7M CO4 L3  
b) List the companies which employ python and quote the areas in which python is used extensively nowadays. 7M CO4 L3

**OR**

8. Illustrate the concept of classes in python with suitable program. 14M CO4 L3

### **UNIT-V**

9. Describe the concept of stack implementation using python list. 14M CO5 L1

**OR**

10. Define Single linked list and examine (i) traversing (ii) searching operations with example program 14M CO5 L1&L3

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