

**CHB-101****Examination - Dec - 2022****B.Tech. I Sem: Common to CSE, CSE BC, IT, AIADS branches  
Applied Chemistry**

Time :2Hrs

Max. Marks : 60  
Min. Marks : 19

**Note:** Total number of questions are 05. All Questions are compulsory. Each Question has 4 parts (a, b, c, d). Part a & b are compulsory while Part c &d has internal Choice. Assume missing data, if any.

**Word limit be observed as follows:**

Part a – Max 50 words,      Part b – Max 50 words,

Part c – Max 100 words and      Part d – Max 400 words.

**Word limit NOT to be followed for diagram, numerical, derivation.**

- Q.1 (a) Following two questions have four options, out of which only one is correct. Write the correct answer only. 02

(i) Which of the following is *NOT* an Internal Conditioning method?

1. Colloidal Conditioning
2. Calgon conditioning
3. Zeolite conditioning
4. Phosphate conditioning

(ii) Which of the following is a *CORRECT* relationship?

1.  $1 \text{ ppm} = 0.07^{\circ}\text{Fr}$
2.  $1^{\circ}\text{Fr} = 1 \text{ ppm}$
3.  $1 \text{ mg/l} = 1 \text{ ppm}$
4.  $1^{\circ}\text{Cl} = 1 \text{ ppm}$

- (b) In the Ion exchange resin method of water softening, hard water is first passed through cation exchanger and then through anion exchanger. Why? 02

- (c) Name various defects caused by hard water in boiler. Discuss any one of these defects. 03

**OR**

50 ml of standard hard water containing 1 mg of pure  $\text{CaCO}_3$  per ml consumed 20 ml of EDTA using Eriochrome Black - T indicator. 03

In another experiment, 100 ml of hard water sample consumed 25 ml of same EDTA solution by same process. Further, 100 ml of same hard water sample after boiling consumed 20 ml of same EDTA solution by same process. Calculate Total, Temporary and Permanent Hardness of water sample.

- (d) Discuss Lime soda process of water softening giving only reactions and diagram. 05

**OR**

What is alkalinity? Write various ions involved in causing alkalinity with reference to Phenolphthalein and Methyl orange indicators. Write significance of alkalinity. 05

- Q.2 (a) Following two questions have four options, out of which only one is correct. Write the correct answer only. 02
- (i) The electrode potential is the tendency of a metal
1. To gain electrons
  2. To lose electrons
  3. Either to lose or to gain electrons
  4. Neither to lose nor to gain electrons
- (ii) Which of the following is a rechargeable cell/battery?
1. Alkaline battery
  2. Dry cell
  3. Lithium ion battery
  4. Mercury battery
- (b) Why does a dry cell become dead after a long time, even if it has not been used? 02
- (c) What are reversible and Irreversible cells? Give examples. 03

**OR**

Calculate the emf of a cell at 25°C, when the concentration of  $\text{ZnSO}_4$  and  $\text{CuSO}_4$  are 0.001 M and 0.1 M respectively. Given:  $E^\circ_{\text{Zn}^{2+}} = -0.76 \text{ V}$  and  $= E^\circ_{\text{Cu}^{2+}} + 0.34 \text{ V}$ . 03

- (d) Derive Nernst's equation and give its applications. 1.5 05

**OR**

Discuss construction, working and advantages of Li ion battery. 05

- Q.3 (a) Following two questions have four options, out of which only one is correct. Write the correct answer only. 02
- (i) The rusting of iron is catalysed by
1. Zinc
  2. Acidic environment
  3. Vacuum
  4. Silver
- (ii) In Galvanisation, the layer of following metal is coated over iron
1. Gold
  2. Silver
  3. Copper
  4. Zinc
- (b) Rusting of iron is faster in sea water as compared to river water. Why? 02
- (c) State and explain Pilling Bedworth rule. 03

**OR**

Discuss electrochemical or wet corrosion. 03

(d) Discuss various factors influencing corrosion.

05

**OR**

Discuss the methods for controlling or preventing corrosion.

05

Q.4 (a) Following two questions have four options, out of which only one is correct. Write the correct answer only. 02

(i) Structural units of polymers are called

1. Thermoplastics
2. Fibers
3. Monomers
4. Resins

(ii) 1 nanometer is equal to

1.  $10^9$  cm
2.  $10^{-9}$  cm
3.  $10^9$  m
4.  $10^{-9}$  m

(b) LDPE and HDPE differ in density. Why? 02

(c) Give classification of polymers with examples. 03

**OR**

What is dye sensitized solar cell? Give their applications.

03

(d) What are conducting polymers? Give preparation and applications of any two of following: 05

1. Polyaniline
2. Polypyrrole
3. Polythiophene

**OR**

Write brief notes on any one of the following:

05

1. Nanomaterials
2. Optical fibers

Q.5 (a) Following two questions have four options, out of which only one is correct. Write the correct answer only. 02

(i) Which is NOT a part of visible region of electromagnetic spectrum

1. Violet light
2. Ultra violet light
3. Yellow light
4. Orange light

(ii) Which is an electroanalytical technique of chemical analysis

1. Conductometry
2. Colorimetry
3. IR spectroscopy
4. UV spectroscopy

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- (b) IR spectroscopy is regarded as Finger Print technique in chemical analysis of organic compounds. Why? 02
- (c) What are electrolytes and non electrolytes? Give examples. 03

**OR**

Write in brief how pH is determined using pH meter? 03

- (d) Discuss principle and instrumentation of Gas Chromatography. 05

**OR**

Discuss principle and instrumentation of IR spectroscopy. 05

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**HUB-102**  
**Examination -Dec- 2022**  
**B.Tech. I Sem :CSE, IT, AIADS, CSE(BC), EE**  
**Communication and Report Writing**

Time : 2 Hrs

Max. Marks : 60  
Min. Marks : 19

**Note:** Total number of questions are 05. All Questions are compulsory. Each Question has 4 parts (a, b, c, d). Part a & b are compulsory while Part c & d has internal Choice. Assume missing data, if any.

**Word limit be observed as follows:**

Part a – Max 50 words,              Part b – Max 50 words,

Part c – Max 100 words and        Part d – Max 400 words.

**Word limit NOT to be followed for diagram, numerical, derivation.**

- |     |   |    |
|-----|---|----|
| Q.1 | (a) Define non verbal communication. Give examples.               | 02 |
|     | (b) Define interpersonal communication giving an example.         | 02 |
|     | (c) What do you understand by physical barriers in communication? | 03 |

**OR**

What is upward communication?	03
-------------------------------	----

- |   |    |
|---|----|
| (d) What is the process of communication? Explain | 05 |
|---|----|

**OR**

Discuss the importance of effective communication in business.	05
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- |     |  |    |
|-----|--|----|
| Q.2 | (a) What are employability skills?                           | 02 |
|     | (b) Is communication an important employability trait?       | 02 |
|     | (c) Discuss briefly the do's and don'ts of Group Discussion. | 03 |

**OR**

What is the role of body language in an interview?	03
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- |  |    |
|--|----|
| (d) What are the different types of interviews? Discuss. | 05 |
|--|----|

**OR**

Elucidate the different types of interview skills needed for an interviewee.	05
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- |     |   |    |
|-----|---|----|
| Q.3 | (a) Define soft skills giving examples.             | 02 |
|     | (b) Why is problem solving important?               | 02 |
|     | (c) Briefly explain the qualities of a good leader. | 03 |

**OR**

How does goal setting help you in your life?

03

(d) What are time wasters? Discuss

05

**OR**

How can one effectively manage time at work?

05

*B  
D  
X*

Q.4 (a) Define a report.

02

(b) Report is the only tangible product of an engineer. Comment.

02

(c) What is the difference between an abstract and summary in report writing?

03

**OR**

What are the different types of reports?

03

(d) Write the technical description of a laptop.

05

**OR**

What are the tips to write a five paragraph essay?

05

Q.5 (a) How is a comma different from a full stop?

02

(b) What is a question tag?

02

(c) Give three different uses of subject verb agreement.

03

**OR**

Define the two types of narration.

03

(d) i. We go to \_\_\_\_ town sometimes to buy clothes. (Insert suitable article)

05

ii. hurrah we won the match (Punctuate the sentence)

iii. You don't get up early in the morning. (Add question tag)

iv. He went \_\_\_\_ the room. (in/into)

v. He said to his friends, "I don't want to take your notes". (Change into Indirect Narration)

**OR**

Why are articles important in English grammar? Explain with the help of some examples.

05

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**CSA-103**  
**Examination – June - 2023**  
**B.Tech. II Sem : CSE, IT, AI, BC, IoT**  
**Problem Solving using Data Structures**

Time : 2 Hrs

Max. Marks : 60  
Min. Marks : 19

**Note:** Total number of questions are 05. All Questions are compulsory. Each Question has 4 parts (a, b, c, d). Part a & b are compulsory while Part c &d has internal Choice. Assume missing data, if any.

Word limit be observed as follows:

Part a & b – Objective type/Fill in the blanks/One sentence answer.

Part c – Max 100 words and Part d – Max 400 words.

Word limit NOT to be followed for diagram, numerical, derivation.

- Q.1 (a) Define the syntax of pointer in C. 02  
 (b) Write one difference between static and dynamic data structure. 02  
 (c) If  $f(n) = O(g(n))$ , then  $g(n) = \Omega(f(n))$ . 03  
 State whether above statement is true or false. Justify your answer.

**OR**

Distinguish between Top-down and Bottom-up approach of programming design on the basis of merits and demerits. 03

- (d) What is an array? Write algorithms for insertion and deletion of n elements from array with their complexities. 05

**OR**

Compare and contrast the various asymptotic notations with graphs. . 05

- Q.2 (a) Write one difference between array and linked list. 02  
 (b) Write one comparison between doubly and singly linked list. 02  
 (c) How do we implement link list. 03

**OR**

Name & describe different operations which you can perform on link list. 03

- (d) What is a Doubly link list? Write an algorithm for insertion and deletion a key element from doubly link list. 05

**OR**

What is a linear link list? Create a list for elements: 3,4,1,6,7,8,9,10 assuming suitable addresses. Perform the deletion for key elements: 6,3,10 and insertion for key elements: 6,3,10. 05

- Q.3 (a) Enumerate one drawbacks of linear queue 02  
 (b) List the any one application of queue. 02

- (c) Define the check for underflow and overflow problem of a stack. 03
- OR**
- Explain the overflow and under flow checks for <sup>Linear</sup> ~~circular~~ queue. 03
- (d) Write an algorithm to perform insertion and deletion operations of linear queue . 05
- OR**
- Explain the overflow and under flow checks for circular queue. 05
- Q.4 (a) List out the one applications of tree structure? 02
- (b) Differentiate full binary tree and complete binary tree. 02
- (c) Form a binary search tree for the following list: 1,2,3,4,5,6,0 03
- OR**
- What is a graph? Explain null graph, connected graph and complete graph. 03
- (d) Write the steps of DFS and BFS algorithm? Apply DFS and BFS for the given graph. 05
- 
- OR**
- What is a binary tree? Make a binary tree using following data: 05
- Inorder: 4,2,7,5,1,8,6,3.
- Preorder: 1,2 ,4,5 ,7,3,6,8
- Q.5 (a) Write one difference between insertion sort and selection. 02
- (b) Define RADIX sort. 02
- (c) Compare linear and binary search. 03
- OR**
- Apply the binary search over the given data and find the key element=1 writing all steps. 03  
(1,3,5,8,9,10,12,14)
- (d) Apply merge sort the following elements using it. 05  
10,50,3,6,8,9,0,12
- OR**
- Apply the quick sort to sort the list 10,50,3,6,8,9,0,12. 05
- \*\*\*\*\*

**ITC-101**  
**Examination – June - 2023**  
**B.Tech. II Sem : CE, AE, EE, EI, EC, CSE, IT, AIADS, CSE(BC), IoT**  
**Python Programming**

Time : 2 Hrs

Max. Marks : 60  
Min. Marks : 19

**Note:** Total number of questions are 05. All Questions are compulsory. Each Question has 4 parts (a, b, c, d). Part a & b are compulsory while Part c & d has internal Choice. Assume missing data, if any.

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Part a & b – Objective type/Fill in the blanks/One sentence answer.

Part c – Max 100 words and Part d – Max 400 words.

**Word limit NOT to be followed for diagram, numerical, derivation.**

- Q.1 (a) (i) Computer uses which number system to perform calculations and store data: 02  
 1. Hexadecimal    2. Decimal    3. Octal    4. Binary
- (ii) What type of programming is supported by Python: 02  
 1. Object-Oriented-Programming    2. Structured Programming  
 3. Functional Programming    4. All of the above
- (b) The correct extension of python file is \_\_\_\_\_. 02
- (c) List the standard data types in python with one example in each. 03
- OR**
- What is a variable in python? What are the rules for naming a variable? Explain by giving examples. 03
- (d) Write a Python program to check whether a number is prime or not prime. 05
- OR**
- What are the various arithmetic and logical operators that python support? Write syntax for each operator. 05
- Q.2 (a) (i) Which of the following operators has its associativity from right to left? 02  
 1. +    2. //    3. %    4. \*\*
- (ii) What will be the output of the following code:  
 n=7  
 c=0  
 while(n):  
     if (n>5):  
         c = c+n-1  
         n = n-1  
     else:  
         break  
 print(n)  
 print(c)
1. 5 11    2. 5 9    3. 7 11    4. 5 2

(b) What will be the output of the following Python code?

```
for i in range(0,2,1):
```

```
    print("Hello")
```

(c) Explain the various control statements in Python with syntax.

**OR**

Write a program to check whether a person is eligible to vote or not. Take age as input from user.

(d) Write the output of the following code:

```
x=5
while (x<15):
    print(x**2)
    x+=3
```

**OR**

Write a program to print the table of a number accepted from user.

Q.3 (a) (i) What will be the output of:

```
str1 = "PYthon class"
print(str1[1:4],str1[0:-1])
```

1. Yth PYthon clas
2. PYt Python class
3. PYth Python clas

(ii) What will be the output of:

```
str1= "Python Lab"
print(len(str1))
```

1. 9
2. 10
3. 11
4. 12

(b) Write the output of the following:

```
str1="PYTHON"
Print(str1.lower())
```

(e) How to split strings and what function is used to perform that operation?

**OR**

Write syntax to take a input from a user and typecast it to an integer.

(d) What is a directory? Which module in python allows to use various methods with directory. Write the syntax for the following: (i) to get current directory in Python  
(ii) change directory in python (iii) making a new directory in python

**OR**

Explain the various functions for reading data from a text file.

02

Q.4 (a) What is the output :

```
colors= ["red", "blue", "green", "pink"]
Print(colors[2])
```

02

(b) What is the output :

```
colors= ["red", "blue", "green", "pink"]
Print("yellow" in colors)
```

03

(c) What is the difference between tuples and list?

**OR**

03

Explain how to create a dictionary in python.

05

(d) Explain indexing and negative indexing in tuple with example.

**OR**

05

Find the output of the following:

```
L1 = [100,900,300,400,500]
START = 1
SUM = 0
for C in range(START,4):
    SUM = SUM + L1[C]
    print(C, ":", SUM)
    SUM = SUM + L1[0]*10
print(SUM)
```

Q.5 (a) What is the output of the following code:

02

class Student:

```
def __init__(self,name,id):
    self.name=name
    self.id=id
    print(self.id)

std=Student("Simon",1)
std.id=2
print(std.id)
```

(b) In python, what is method inside class?

1. Attribute    2. Object    3. Argument    4. function

02

05

(e) Explain operator overloading with an example in python.

OR

03

What is the output of the following code:

```
class A():
    def disp(self):
        print("A disp()")
class B(A):
    pass
obj = B()
obj.disp()
```

05

(d) Explain exception handling with example.

OR

05

Explain Method Resolution order in Python with an example.

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**MAB-102****Examination – June - 2023****B.Tech. II Sem : Common for all Branches****Statistics: Probability Distributions and Differential Equations**

Time: 2 Hrs

Max. Marks : 60

Min. Marks : 19

**Note:** Total number of questions are 05. All Questions are compulsory. Each Question has 4 parts (a, b, c, d). Part a & b are compulsory while Part c & d has internal Choice. Assume missing data, if any. Word limit be observed as follows:

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Word limit NOT to be followed for diagram, numerical, derivation.

**Q1** (a) The variance of the Binomial distribution is 02

- (i)  $npq$     (ii)  $np$     (iii)  $\sqrt{npq}$     (iv)  $nq$

(b) The formula of Poisson's distributions..... 02

(c) Find the mean of the Binomial distribution. 03

**OR**

Find the mean of the Normal distribution. 03

(d) Fit a straight line to the following data: 05

X: 0	1	2	3	4
Y : 1	1.8	3.3	4.5	6.3

**OR**

If the probability that an individual suffers a bad reaction from a certain injection is 0.001, 05  
Determine the probability that out of 2000 individuals.

- (i) exactly 3 (ii) More than two individuals (iii) More than one individuals will suffer a bad reaction.

**Q2** (a) What is the mean of Chi-square distribution with six degree of freedom? 02

- (i) 4    (ii) 12    (iii) 6    (iv) 8

(b) A part is selected from the population is called..... 02

(c) What is the purpose of Chi-square Test. 03

**OR**

Define null hypothesis and alternative hypothesis. 03

(d) The height of ten males of a given locality is found to be 70, 67, 62, 68, 61, 68, 70, 69, 64, 66 inches. Is it reasonable to believe that the average height is 64 inches? 05

Test at 5% significance level assuming that for 9 degree of freedom is 1.83.

**OR**

The demand for a particular in a factory was found day to day. In sample study, the following information was obtained: 05

Days	: Mon	Tue	Wed	Thurs	Fri.	Sat.
No. of parts demanded:	1124	1125	1110	1125	1125	1116

Use Chi-square to test the hypothesis that number of parts demanded does not depend on the day of the week at 5% level of significance ( $5df = 11.07$ ).

- Q.3 (a) The number of arbitrary constants in the general solution of differential equation of second order is ..... 02  
 (i) 1    (ii) 0    (iii) 2    (iv) 3 02
- (b) The general equation of exact differential equation is ..... 03
- (c) Solve:  $y = 2px + p^n$

**OR**

$$\text{Solve: } (D^2 - 5D + 6)y = e^{4x}$$

03

(d) Solve:  $(D^2 - 2D + 1)y = x \sin x.$  05

**OR**

$$\text{Solve: } (D^2 - 4D + 4)y = 8x^2 e^{2x} \sin 2x.$$

05

- Q.4 (a) The Cauchy's Linear differential equation  $x^n \frac{d^n y}{dx^n} + a_1 x^{n-1} \frac{d^{n-1} y}{dx^{n-1}} + \dots + a_n y = f(x)$  can be reduced to a linear differential equation with constant coefficient by using substitution  
 (i)  $x = e^z$     (ii)  $y = e^z$     (iii)  $z = e^x$     (iv)  $z = e^y$  02
- (b) The general equation of Legendre's Linear Differential equation is ..... 02
- (c) Solve :  $Dx + \omega y = 0$   
 $Dy - \omega x = 0$  03

**OR**

$$\text{Solve: } (x^3 D^2 - 4x^2 D + 6x)y = x.$$

03

(d) Solve by the method of variation of parameter  $(D^2 + 1)y = x.$  05

**OR**

$$\text{Solve: } (x^3 D^3 + 2x^2 D^2 + 2)y = 10(x + 1/x).$$

05

- Q.5 (a) The partial differential equation formed from  $z = f(x + iy) + F(x - iy).$  02  
 (i)  $p + q = 0$     (ii)  $r + s = 0$     (iii)  $r + t = 0$     (iv)  $p + q = f$
- (b) The complementary function of  $p + q = \sin 2x$  is ..... 02
- (c) Solve:  $(z^2 - 2yz - y^2)p + (xy + zx)q = xy - zx.$  03

**OR**

Solve by Charpit's method  $z = pq.$  03

(d) Solve:  $r - s - 2t = (y - 1)e^x.$  05

**OR**

Solve  $\frac{\partial u}{\partial x} = 2 \frac{\partial u}{\partial t} + u$  by the method of separation of variables where  $u(x, 0) = 6e^{-3x}.$  05

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**HUB-101**  
**Examination – June - 2023**  
**B.Tech. I/II Sem : CE, AE / ME, EI, EC, IoT**  
**Language and Writing Skills**

Time : 2 Hrs

Max. Marks : 60  
Min. Marks : 19

**Note:** Total number of questions are 05. All Questions are compulsory. Each Question has 4 parts (a, b, c, d). Part a & b are compulsory while Part c & d has internal choice. Assume missing data, if any.

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**Q.1** (a) The four basic language skills are:

- |       |            |           |                |               |
|-------|------------|-----------|----------------|---------------|
| (i)   | Reading,   | Writing,  | Listening,     | Speaking      |
| (ii)  | Listening, | Speaking, | Understanding, | Communicating |
| (iii) | Speaking,  | Reading,  | Listening,     | Convincing    |
| (iv)  | Writing,   | Speaking, | Reading,       | Expressing    |

02

(b) What is the importance of role playing?

- (i) Role of student in the class.
- (ii) Teacher-student interaction.
- (iii) To teach students effectively.
- (iv) To solve real life problems.

02

(c) How do conversational skills help in building confidence?

03

**OR**

Write three do's and don'ts of debate.

03

(d) What do you mean by oral presentation?

05

**OR**

Discuss the benefits of JAM session.

05

**Q.2** (a) Complete the following sentences by adding correct prepositions in the blank spaces:

02

- (i) The letter came-----post.
- (ii) Write the exercise -----ink.
- (iii) What are you looking-----?
- (iv) They left-----9.00AM.

(b) She is eating mangoes. (Change the voice).

02

I have not tasted the food. (Change the voice).

(e) Write three different uses of full stop.

03

**OR**

What are the uses of present perfect tense?

03

(d) List different parts of speech with examples of each.

05

**OR**

05

Name the types of sentences and explain any one of them.

02

Q.3 (a) What are Antonyms? Give two examples.

02

(b) Give Synonyms of (any two)

(i) Cease (ii) Brittle (iii) Contradict (iv) Barrier

03

(c) Define Homophone with an example.

**OR**

03

How does dictionary help in improving vocabulary?

05

(d) What are Jargons? Explain with examples.

**OR**

05

Discuss the role of Grammar in communication.

02

Q.4 (a) (I) A precis must use the -----tense of verbs.

(i) Present (ii) Past (iii) Future (iv) Present Continuous

(II) A precis must always have a

(i) Story (ii) Subheading (iii) Incident (iv) Heading

02

(b) What is note making?

02

(c) What are the methods of preparing notes? Explain any one.

03

**OR**

Give two benefits of Active and Passive reading.

03

(d) What is paragraph writing? Give some tips to write a good paragraph.

05

**OR**

Write a paragraph on: Indian Culture.

05

Q.5 (a) Which one of the following is correct in an official letter?

(i) Yours' truly (ii) Yours truly (iii) Your's truly (iv) Yours Truly

02

(b) What is email writing detail?

02

(c) How do business letters differ from personal letter?

03

**OR**

Write short notes on any two of the following:

03

(i) Memo (ii) Agenda (iii) Minutes of meeting (iv) Circulars

(d) Write a Job application to Mr. B. G. Joshi, General Manager, Zee Ltd. 10 Juhu, Mumbai for the post of Executive Engineer with a structured resume.

05

**OR**

Write a leave application addressing HOD, asking for 5 days leave (do not write your name or roll no.).

05

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**CSA-101**  
**Examination - Dec- 2022**  
**B.Tech. I Sem : CSE, IT, AIADS, CSE(BC), IoT**  
**Introduction to Computer Science Engineering**

Max. Marks : 60  
Min. Marks : 19

Time : 2 Hrs

**Note:** Total number of questions are 05. All Questions are compulsory. Each Question has 4 parts (a, b, c, d). Part a & b are compulsory while Part c & d has internal choice. Assume missing data, if any.

**Word limit be observed as follows:**

Part a – Max 50 words,      Part b – Max 50 words,

Part c – Max 100 words and      Part d – Max 400 words.

Word limit NOT to be followed for diagram, numerical, derivation.

- |  |                |
|--|----------------|
| <span style="font-size: 2em; color: #0000ff;">Q.1</span> <input checked="" type="checkbox"/> (a) What are the four basic operations performed by the computer?<br><input checked="" type="checkbox"/> (b) Define computer. What are the applications of a computer?<br><input checked="" type="checkbox"/> (c) What are the differences between RAM and ROM? | 02<br>02<br>03 |
|--|----------------|

**OR**

What is a bus? Describe the functions of a control bus?	03
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- |   |    |
|---|----|
| <span style="font-size: 2em; color: #0000ff;">Q.1</span> <input checked="" type="checkbox"/> (d) What are different registers in CPU? What are their functions? | 05 |
|---|----|

**OR**

What is software? What are its different types? Explain each in detail.	05
---	----

- |  |                |
|--|----------------|
| <span style="font-size: 2em; color: #0000ff;">Q.2</span> <input checked="" type="checkbox"/> (a) What are flowcharts?<br><input checked="" type="checkbox"/> (b) What are the rules to be followed in naming variables?<br><input checked="" type="checkbox"/> (c) Explain the structure of C program. | 02<br>02<br>03 |
|--|----------------|

**OR**

What are logical operators?	03
-----------------------------	----

- |   |    |
|---|----|
| <span style="font-size: 2em; color: #0000ff;">Q.2</span> <input checked="" type="checkbox"/> (d) What are data types? Explain its types and its type modifiers. | 05 |
|---|----|

**OR**

Explain the following control constructs- If-else, for, while and do-while.	05
--	----

- |   |                |
|---|----------------|
| <span style="font-size: 2em; color: #0000ff;">Q.3</span> <input checked="" type="checkbox"/> (a) How many types of array are there?<br><input checked="" type="checkbox"/> (b) What are functions in C programming?<br><input checked="" type="checkbox"/> (c) What do you mean by scope of a variable? | 02<br>02<br>03 |
|---|----------------|

**OR**

State the difference between call by value and call by reference.	03
---	----

(d) What are pointers? Also explain the actual and formal arguments.

**OR**

05

What is recursion? Write a simple C program to show the application of recursion.

02

Q.4 (a) What are Macros?

02

(b) How the structure elements are accessed?

03

(c) How structure is declared?

**OR**

03

What are enumerated data types?

05

(d) What are preprocessor directives? Also explain at least two with example.

**OR**

05

What is the use of structure in C programming language?

Q.5 (a) What is web development?

02

(b) What is Block Chain technology?

02

(c) Explain any three functions of an operating system

03

**OR**

Explain different types of cloud computing.

03

(d) What is Machine Learning? Also discuss its types.

05

**OR**

Explain the lifecycle of Data Science.

05

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**MAB-101**  
**Examination -Dec- 2022**  
**B.Tech. I Sem : Common for all Branches**  
**Linear Algebra and Calculus**

Time : 2 Hrs

Max. Marks : 60  
Min. Marks : 19

**Note:** Total number of questions are 05. All Questions are compulsory. Each Question has 4 parts (a, b, c, d). Part a & b are compulsory while Part c & d has internal Choice. Assume missing data, if any.

**Word limit be observed as follows:**

Part a – Max 50 words,      Part b – Max 50 words,

Part c – Max 100 words and      Part d – Max 400 words.

**Word limit NOT to be followed for diagram, numerical, derivation.**

- Q.1
- (a) Write the statement of Maclaurin's theorem Theorem. 02
  - (b) Expand  $\log x$  in power of  $(x - 1)$  by taylor's theorem. 02
  - (c) Find the first four terms in the expansion of  $\log(1 + \sin x)$  by Maclaurin's theorem 03

**OR**

Find the radius of curvature of the following curves at the points indicated against them 03  
 $\sqrt{x} + \sqrt{y} = \sqrt{a}$ ,  $(1/4, 1/4)$ .

- (d) Discuss the maxima and minima of the function  $U = \sin x \sin y \sin(x+y)$ . 05

**OR**

Find the radius of curuature at the Pamt "t" of the curve. 05  
 $x = 3a \cos t - a \cos 3t$ ,  $y = 3a \sin t - a \sin 3t$

- Q.2
- (a) If  $u = \sin^{-1}(x/y) + \tan^{-1}(y/x)$  Show that  $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = 0$  02
  - (b) State and prove Euler's theorem 02
  - (c) if  $u = (x^2 + y^2 + z^2)^{-1/2}$  Show that  $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z} = -u$  03

**OR**

If  $x^x y^y z^z = c$  then show that  $\frac{\delta^2 z}{\delta x \delta y} = -(x \log ex)^{-1}$ . 03

- (d) If  $u = f(r)$ , Where  $r^2 = x^2 + y^2$  Show that  $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = f''(r) + \frac{1}{r} f'(r)$ . 05

**OR**

If  $u = \sin^{-1} \left( \frac{x^{1/3} + y^{1/3}}{x^{1/2} + y^{1/2}} \right)^{1/2}$  then show that 05

$$x^2 \frac{\partial^2 u}{\partial x^2} + y^2 \frac{\partial^2 u}{\partial y^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} = \frac{\tan u}{144} (13 + \tan^2 u)$$

Q.3

(a) Evaluate

$$\int_0^2 \int_0^1 (x^2 + y^2) dx dy$$

0

02

(b) Find the limit as  $n \rightarrow \infty$  of the series

$$\frac{1}{n} + \frac{n^2}{(n+1)^3} + \frac{n^2}{(n+1)^3} + \dots + \frac{1}{n} (n+1)^3$$

03

(c) Find the area included between the parabola  $y^2 = 4ax$  and  $x^2 = 4ay$ **OR**Find the limit as  $n \rightarrow \infty$  of the series

03

$$\left[ \left( 1 + \frac{1}{n^2} \right) \left( 1 + \frac{2^2}{n^2} \right) \left( 1 + \frac{3^2}{n^2} \right) \dots \left( 1 + \frac{n^2}{n^2} \right) \right]^{\frac{1}{n}}$$

(d)

Evaluate  $\int_0^4 \int_0^x \int_{x^2}^{x+y} z dz dy dx$ 

05

**OR**Change the order of integration in  $\int_0^1 \int_{x^2}^{2-x} xy dx dy$  and hence evaluate it.

05

Q.4

(a)

Find the characteristic root's of the matrix  $A = \begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$ 

02

(b)

Define Echelon form of a matrix with example

02

(c)

Reduce the Matrix to normal form and find it's rank.

03

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

**OR**

Verify Calley – Hamilton theorem for matrix.

03

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

(d)

Check the consistency of the following system of equations.

05

$$7x_1 + 2x_2 + 3x_3 = 16$$

$$2x_1 + 11x_2 + 5x_3 = 25$$

$$x_1 + 3x_2 + 4x_3 = 13$$

**OR**

Determine the eigen values and eigen vectors of the matrix

05

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

Q.5

(a) Define Equivalent, Contradiction.

02

(b) If p and q are two statements prove that  $(p \wedge q) \Rightarrow p$  is a tautology.

02

(c) State and prove Demorgan's law.

03

**OR**

(1) Degree of vertex (2) Walk (3) Isomorphic graph.

03

(d) Express the following function into disjunctive normal form:

05

$$F(x, y, z) = (x+y)(x+z') + (y+z')$$

**OR**

Simplify the following  $(a+b). (a'+b). (a'+b') = a'b'$

05

$$pqr + pqr' + pq'r + p'qr = pq + qr + rp$$

\*\*\*\*\*

3

03

0

0

101

**IOA-103**  
**Examination –Dec-2022**  
**B.Tech. I Sem: Internet of Things**  
**Basic Electrical Engineering**

Time : 2 Hrs

Max. Marks: 60  
Min. Marks: 19

**Note:** Total number of questions are 05. All Questions are compulsory. Each Question has 4 parts (a, b, c, d). Part a & b are compulsory while Part c & d has internal Choice. Assume missing data, if any.

**Word limit be observed as follows:**

Part a – Max 50 words,      Part b – Max 50 words,

Part c – Max 100 words and      Part d – Max 400 words.

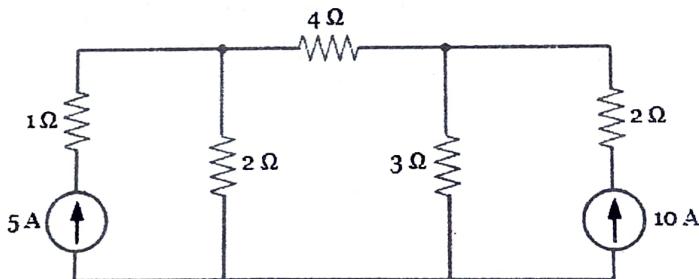
**Word limit NOT to be followed for diagram, numerical, derivation.**

- Q.1 (a) Explain difference between mesh and loop? 02  
 (b) What are voltage source and current sources? 02  
 (c) State and explain thevenin's theorem? 03

**OR**

What is maximum transfer theorem? Derive the condition of maximum power in network? 03

- (d) Determine the current through each resistor in the given circuit using nodal analysis 05

**OR**

State and explain Norton theorem drawing diagram in each step? 05

- Q.2 (a) Discuss the advantages of three phase system? 02  
 (b) What is power factor? Discuss the practical importance of power factor? 02  
 (c) A coil of resistance 100 ohm and inductance 0.1 H is connected in series with 150 microfarad capacitor across a 200 V, 50 Hz supply. Calculate: 03  
 (i) Inductive reactance (ii) Capacitive reactance  
 (iii) Impedance (iv) Power factor (v) Current (vi) Voltage across the coil.

**OR**

Derive relations and draw phasor diagram for RLC series circuit? 03

(d) Deduce relationships for star connection in three phase AC system for line voltage, phase voltage, line current and phase current? 05

**OR**

A balanced star connected load is supplied from a balanced 3 phase, 400 V, 50 Hz system. The current in each phase is 30 A and lags 30 degree behind the phase voltage. Find the total power and phase voltage. Draw the phasor diagram also? 05

Q.3 (a) What is the difference between normal efficiency and all day efficiency in single phase transformer? 02

(b) Explain the working principle of single phase transformer? 02

(c) A single phase transformer is connected across 200 V, 50 Hz supply. Number of turns in primary is 500 while in secondary is 1000. The net cross sectional area of the core is 80 cm square. Calculate (1) Transformation ratio (2) Maximum flux density (3) Emf induced in secondary winding 03

**OR**

What are various losses in a transformer? Where do they occur and how do they vary with load? 03

(d) Explain open circuit and short circuit tests of single phase transformer drawing circuit diagram? 05

**OR**

The following results were obtained on a 50 KVA 2200/100V transformer: 05

Open circuit test instrument on l.v. side

Wattmeter reading= 350 W

Ammeter reading= 9A

Voltmeter reading= 100 V

Short circuit test instrument on h.v. side

Wattmeter reading= 750 W

Ammeter reading= 18 A

Voltmeter reading= 85 V

Determine: (1) The open circuit and short circuit parameter

(2) The efficiency at full load, 0.8 p.f. lagging.

Q.4 (a) Name the various parts of a dc machine? 02

(b) Compare between salient pole and non salient pole Alternator. 02

(c) A 4 pole generator with wave wound armature has 51 slots each having 24 conductors. The flux per pole is 0.01 weber. At what speed must the armature rotate to give an induced emf of 220 V. What will be the voltage developed if the winding is lap connected and the armature rotates at the same speed. 03

**OR**

Draw the Torque slip characteristics of three phase induction motor? 03

(d) Discuss the principle of operation of three phase induction motor stating its advantages? 05

OR

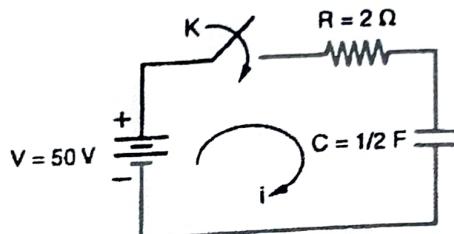
What are the different speed control methods of separately excited DC motor? 05

- Q.5 (a) Define initial condition, time constant, and admittance in a network? 02  
(b) Discuss the difference between steady state and transient response in network? 02  
(c) What are two port networks? Discuss different parameters of two port network? 03

OR

If switch is closed at  $t = 0$ .

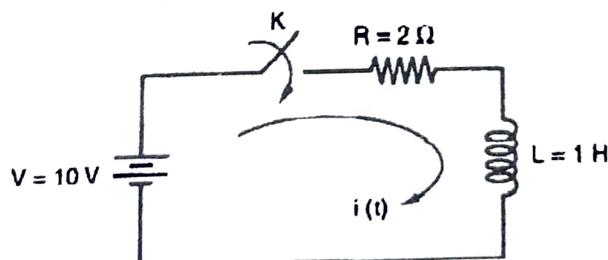
Find  $i(0+)$  and  $\frac{di}{dt}(0+)$ .



- (d) Discuss the transient response of RC series circuit writing all relations associated with it. 05

OR

Find the expression for current if switch is closed at  $t=0$ . Also determine the time constant of circuit and draw the variation of current with time. 05



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**CSA-102**  
**Examination -Dec- 2022**  
**B.Tech. I Sem : CSE, IT, AIADS, CSE(BC), IoT**  
**Digital Electronics**

Time : 2 Hrs

Max. Marks : 60  
Min. Marks : 19

**Note:** Total number of questions are 05. All Questions are compulsory. Each Question has 4 parts (a, b, c, d). Part a & b are compulsory while Part c & d has internal Choice. Assume missing data, if any.

**Word limit be observed as follows:**

Part a – Max 50 words,      Part b – Max 50 words,

Part c – Max 100 words and      Part d – Max 400 words.

**Word limit NOT to be followed for diagram, numerical, derivation.**

- Q.1 (a) Add  $(756)_8 + (ACC)_{16}$  02  
 (b) Representation of 7 in 8 4 -2 -1 code 02  
 (c) Perform the BCD addition  $(175)_{10} + (259)_{10}$  03

**OR**

Convert  $(135)_{10}$  to Gray code 03

- (d) A 7-bit Hamming code 1010110 is received in which almost a single error has occurred. Locate the position of the error bit using parity checks assuming code was created using an even parity 05

**OR**

Solve the following : 05

- (a) Convert  $(01FA.3A)_{16}$  to  $(N)_2$   
 (b)  $(255)_{10}$  to  $(N)_8$   
 (c) Subtract  $(011011)_2 - (110011)_2$   
 (d)  $(1721.54)_8$  to  $(N)_{10}$   
 (e) 2's complement of  $(1011010)_2$

- Q.2 (a) Obtain the simplified expressions in sum of products for the following Boolean functions:  $F(x,y,z) = \sum(2,3,12,13,14,15)$  02

- (b)  $F = \pi(0,1,2,3,4,10,11)$ , find POS. 02

- (c) Simplify the Boolean functions F using the don't-care conditions in Sum of product form 03

$$F = A'B'D' + A'CD + A'BC$$

$$d = A'BC'D + ACD + AB'D'$$

**OR**

Find POS

$$F = (A+B'+D)(A'+B+D)(C+D)(C'+D')$$

03

- (d) Implement the function using NAND gate in SOP form  
 $F = B'D + B'C + ABCD$   
 $d = A'BD + AB'C'D'$

05

**OR**

- Design a combinational circuit whose input is 3-bit number and whose output is the 2's complement of the input number.

- Q.3 (a) Implement the Boolean expression  $F(A,B,C) = \sum m(0,3,5,6)$  using 4:1 multiplexer.

02

- (b) Explain the working of Encoder.

02

- (c) Explain full subtractor.

03

**OR**

- Construct a 5  $\square$  32 decoder using four 3  $\square$  8 decoder and one 2  $\square$  4 decoder

03

- (d) Implement full adder with two half adder and one OR gate with its truth table

05

**OR**

- Design a Binary to Gray code converter.

05

- Q.4 (a) What is the difference between Sequential Circuit and combinational circuit?

02

- (b) Explain SR Latch flip-flop using NAND Gate.

02

- (c) Explain JK flip-flop with characteristics and Excitation table.

03

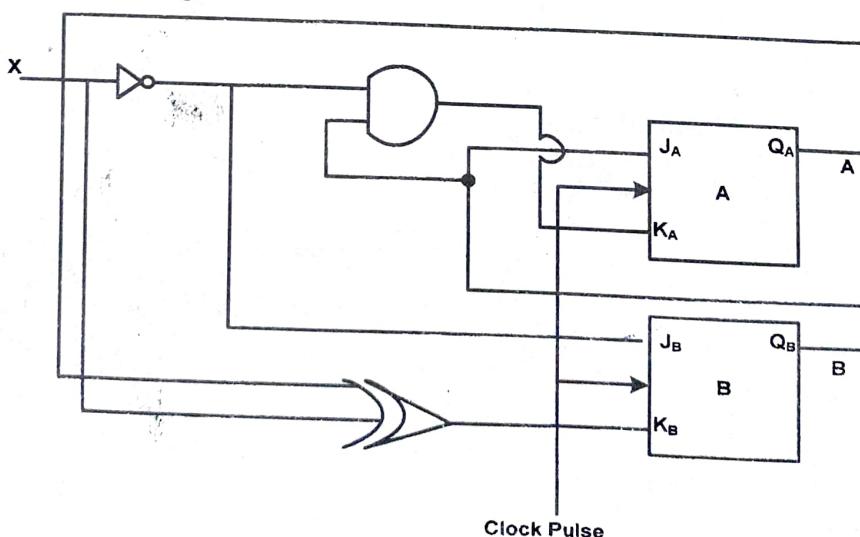
**OR**

- Convert JK Flip Flop to T Flip Flop.

03

- (d) Find the state diagram

05



68  
25

**OR**

Explain different type of shift register explain them with neat diagram.

05

Q.5 (a) Write a difference between Asynchronous and Synchronous counter. 02

02

(b) Design 2-bit asynchronous up counter using J-K flip-flop. 03

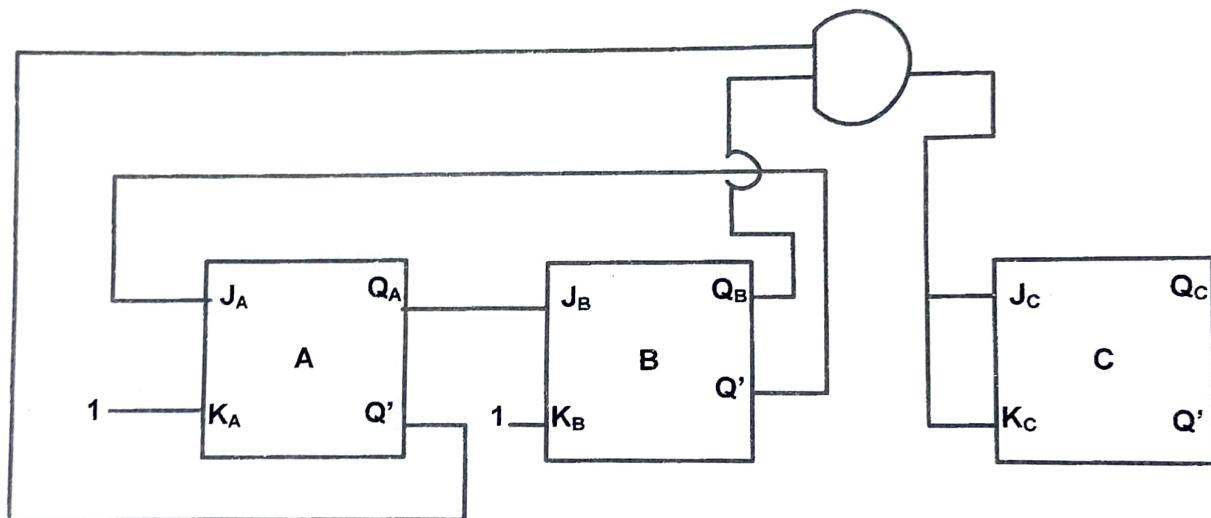
03

(c) Design a 3-bit Synchronous up counter using T flip-flop. 03

**OR**

Design a synchronous counter that will count 0, 3, 5, 7. 03

(d) Calculate the next three state of counter if the initial state is '0 0 0'. 05

**OR**

Design a mode 6 down asynchronous counter for active low pre-set. 05

05

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**CHB-101****Examination –June- 2023**

**B.Tech. I/II Sem : CSE, IT, AI, BC / EE, EI, EC, IoT**  
**Applied Chemistry**

Time :2 Hrs

Max. Marks : 60

Min. Marks :19

**Note:** Total number of questions are 05. All Questions are compulsory. Each Question has 4 parts (a, b, c, d). Part a & b are compulsory while Part c &d has internal Choice. Assume missing data, if any.

**Word limit be observed as follows:**

**Part a & b – Objective type/Fill in the blanks/One sentence answer.**

**Part c – Max 100 words and Part d – Max 400 words.**

**Word limit NOT to be followed for diagram, numerical, derivation.**

- Q.1 (a) Following two questions have four options, out of which only one is correct. Write the correct answer only. 02
- (i) A water sample containing hardness in range of 0 to 60 ppm, may be categorized as
    - (1) Hard water
    - (2) Very Hard water
    - (3) Soft Water
    - (4) Moderately hard water
  - (ii) Which of the following is NOT a softening method
    - (1) Sterilisation using Bleaching Powder
    - (2) Lime Soda method
    - (3) Zeolite method
    - (4) Ion Exchange Resin method
- (b) 500 ml of water sample contains 0.292 g of calcium oxalate monohydrate. Express calcium concentration in ppm. 02
- (c) Why is hardness of water expressed in terms of  $\text{CaCO}_3$  equivalent? Give relationship between different units for expressing hardness of water. 03

**OR**

Write the formula and names of substances which impart temporary and permanent hardness to water. 03

- (d) Explain Ion Exchange Resin method of water softening giving only: 05
- (i) Well labelled diagram
  - (ii) Chemical reactions involved including regeneration of resins
  - (iii) Hardness of soft water obtained in ppm

**OR**

A hard water sample has following compounds: 05

$\text{Ca}(\text{HCO}_3)_2 = 162 \text{ ppm}$ ;  $\text{Mg}(\text{HCO}_3)_2 = 73 \text{ ppm}$ ;  $\text{CaCl}_2 = 111 \text{ ppm}$ ;  $\text{MgCl}_2 = 95 \text{ ppm}$ ;  
 $\text{CaSO}_4 = 136 \text{ ppm}$ ;  $\text{MgSO}_4 = 120 \text{ ppm}$ ;  $\text{CO}_2 = 44 \text{ ppm}$ .

Calculate Temporary and Permanent Hardness of water. Also calculate the quantity of lime and soda required for softening 100000 litres of this water.

Q.2 (a) Following two questions have four options, out of which only one is correct. Write the correct answer only.

- (i) A galvanic cell converts  
    (1) Electrical energy into chemical energy   (2) Chemical energy into heat energy  
    (3) Chemical energy into electrical energy   (4) Electrical energy into heat energy

- (ii) Which is correct regarding efficiency of various batteries  
    (1) Lead battery > Galvanic cell > Li ion   (2) Galvanic cell > Li ion > Lead battery  
    (3) Li ion > Galvanic cell > Lead battery   (4) Li ion > Lead battery > Galvanic cell

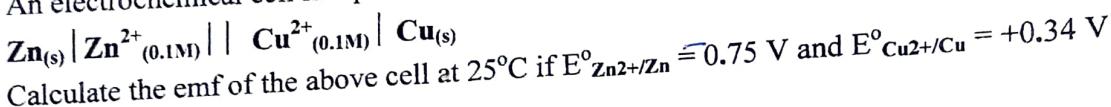
- (b) Write the reactions taking place in Lead accumulator battery during charging and discharging.

- (c) Write construction and working of <sup>standard</sup> Normal Hydrogen electrode

OR

02  
03  
03

An electrochemical cell is represented as



Calculate the emf of the above cell at 25°C if  $E^{\circ}_{\text{Zn}^{2+}/\text{Zn}} = 0.75 \text{ V}$  and  $E^{\circ}_{\text{Cu}^{2+}/\text{Cu}} = +0.34 \text{ V}$

05

- (d) Draw a well labeled diagram of Lithium ion batteries. Also write the reactions taking place at anode and cathode. Compare the efficiency of Lithium ion batteries with other batteries.

OR

- Derive Nernst's equation for electrode potential of a cell. Write importance and applications of Nernst's equation.

05

Q.3 (a) Following two questions have four options, out of which only one is correct. Write the correct answer only.

- (i) When a buried pipeline is protected from corrosion by connecting to Mg block, it is called  
    1. impressed voltage protection   2. sacrificial anodic corrosion

- (3) sacrificial cathodic <sup>protection</sup> corrosion   4. passivity

- (ii) Electrochemical corrosion can only occur only if

1. Oxygen is present in contact with metal

2. Air is present in contact with metal

- (3) Liquid medium is present in contact with metal

4. Nitrogen is present in contact with metal

- (b) Why does corrosion of water filled iron tanks occur below the waterline?

02  
03

- (c) Differentiate between corrosion and protection of metals.

OR

03

Explain briefly various factors affecting corrosion.

- (d) Discuss various methods applied for protection of metals from corrosion.

05

OR

Explain the mechanism of Electrochemical corrosion. How does it differ from Chemical corrosion?

05

Q.4 (a) Following two questions have four options, out of which only one is correct. Write the correct answer only. 02

(i) Polymerisation in which two or more chemically different monomers take part, is called

1. Addition Polymerisation
2. Condensation Polymerisation
3. Co Polymerisation
4. Chain Polymerisation

(ii) For making rechargeable batteries, which polymeric material is generally used?

1. Polypropylene
2. Polyglycol
3. Polypeptide
4. Polyaniline

(b) What are photoactive polymers? Give its uses. 02

(c) What are electroactive polymers? Give examples. Write their applications. 03

**OR**

What are nanomaterials? Give examples. Write important applications of nanomaterials in modern technologies. 03

(d) Write method of preparation and properties of any two of the following: 05

1. Polypyrrol
2. Polyaniline
3. Polythiophene

**OR**

Write brief notes on any two of the following:

1. Optical Fibers
2. Liquid Crystal Polymers
3. Graphene

Q.5 (a) Following two questions have four options, out of which only one is correct. Write the correct answer only. 02

(i) Reciprocal of wavelength of a radiation is called

1. Frequency
2. Wave Number
3. Density
4. Velocity

(ii) Which of the following expresses correct pH for entire range of pH scale

1. <7 Basic; 0 Neutral; >7 Acidic
2. >7 Acidic; 7 Neutral; <7 Basic
3. >7 Basic; 7 Neutral; <7 Acidic
4. <7 Acidic; 0 Neutral; >7 Basic

(b) Selection of an appropriate filter (having a specific wavelength) is required in colorimetry. Why? 02

(c) Draw a well labelled diagram of instrument used in Gas Chromatography. 03

**OR**

Draw a well labelled diagram of the instrumental set up used in conductivity measurement. 03

(d) State and derive Beer Lambert's law. How Beer Lambert's law can be verified colorimetrically using KMnO<sub>4</sub> solution. 05

**OR**

Define pH value. What is pH scale? How pH of a solution is determined using pH meter? 05

\*\*\*\*\*

Y  
3