

NATIONAL INSTITUTE OF TECHNOLOGY PATNA
Department of Computer Science and Engineering
MID SEMESTER EXAMINATION, July-Dec 2022

B.Tech: 1st Semester (CSE)
Course Name: Programming in C
DOE: 12/01/2023
Maximum Time: 02 hours

Exam Time: 10:30AM-12:30PM
Course Code: CS14102
Max. Marks: 30

Instruction: All questions are compulsory and sub-questions must be answered sequentially in one place

S.N.	Questions	Marks	CO	BL
1. a)	Define an array. How to declare and access elements of an array?	3	CO1	Remember
b)	Why identifier is required in C language? List the basic rules for naming identifier?	2		
c)	How high-level differs from low-level programming language?	3 [3+2+3=8]		
2. a)	Write an algorithm to compute the average of numbers?	4	CO2	Understand
b)	How to use conditional operator? Illustrate it using suitable example.	4		
c)	Why <i>switch</i> is more efficient than a set of nested <i>if</i> statements?	2 [4+4+2= 10]		
3. a)	Illustrate the difference between <i>for loop</i> and <i>do-while loop</i> using flowchart. How to use these two loops in C program?	4	CO2	Understand
b)	What will be the output of the following program? Explain why? main() { int n[50], i; for(i = 0; i<=100; i++) n[i] = i; }	2 [4+2 = 6]		
4. a)	Write a C program to print the following output using <i>while</i> loop. Output: 10 8 6 4 2	2	CO3	Apply
b)	Write a program to multiply two positive numbers without using multiplication (*) operator in C language.	2 [2+2 = 4]		
5.	Which of the following are incorrect expressions and why? int a, b, c, d, e, f, g; float x, y, z; double p, q; i) a + b - c ii) a - 2.0 iii) a ** b + g iv) (e * (f + d) v) x /+ z vi) (x/y - q) * (p/q *2.0)	2 [2]	CO3	Apply

All the best

National Institute of Technology

Mid Sem Exam July-Dec 2022

Sub: Engineering Chemistry

Subject Code: CH19101

Branch: B.Tech (CSE) (Section A)

Time = 2 hours

F.M = 30

Can Answer all questions

$$4\frac{1}{2} + 3 = 7\frac{1}{2}$$

CO1

Q1 (a) How can you determine percentage of Carbon, hydrogen and sulphur by ultimate analysis?

(b) A sample of coal was analysed as follows:

Exactly 1.5 g of coal was weighed into a silica crucible. After heating for one hour at 110°C , the residue weighed 1.415 g. The crucible was then covered with a vented lid and strongly heated for exactly seven minutes at 925°C . The residue weighed 0.528 g. The crucible was then heated without the cover, until a constant weight was obtained. The last residue was found to weigh 0.254 g. Calculate the percentage results of the above analysis.

$$1.5 + 2 + 2 + 2 = 7\frac{1}{2}$$

CO2

Q2 (a) Write the effect of dilution on Conductance, specific conductance & Equivalent Conductivity.

(b) Explain Kohlrausch Law. Write three application of Kohlrausch Law.

(c) The resistance of $\frac{N}{2}$ solution of an electrolyte in a cell was found to be $95\ \Omega$. The electrode in the cell are 2.2 cm apart and have an area of 3.8 cm^2 . Find the equivalent conductivity.

(d) The Λ_m^∞ for Sodium acetate, HCl & NaCl are 91.0 , 425.9 and $126.4\text{ S cm}^2\text{ mol}^{-1}$ respectively at 298 K . Calculate Λ_m^∞ for CH_3COOH .

Q3 (a) Explain VSEPR theory and Bent's rule.

$$4 + 3\frac{1}{2} = 7\frac{1}{2}$$

CO3

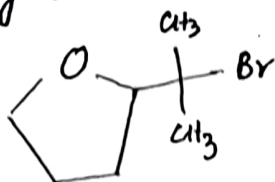
(b) Write shape of: PCl_3F_2 , SOF_4 , XeO_3F_2 , XeF_2 , $\text{PCl}_2(\text{CH}_3)_3$, SF_4 , XeF_5^-

Q4 (a) Explain $\text{S}_\text{N}2$ & $\text{E}2$ reaction.

$$4 + 3\frac{1}{2}$$

CO4

(b) Write the most stable product and what is the reaction mechanism, when the following bromide is heated with water.



Water, ^{Low} High Temperature \rightarrow ?

2206032

NATIONAL INSTITUTE OF TECHNOLOGY PATNA
 Department of Computer Science and Engineering
MID SEMESTER EXAMINATION, Dec-Feb 2023

B.Tech.: CSE, 1st Semester
Course Name: Information Technology Workshop
DOE: 09/01/2023

Course Code: CS14016
Max. Marks: 30
Exam Time: 1:30 PM to 3:30
Maximum Time: 2 hours

Instruction:

1. Attempt all questions.
2. Assume any suitable data, if necessary.
3. The Marks, CO (Course Outcome) and BL (Bloom's Level) related to questions are mentioned on the right-hand side margin.

S.N.	Questions	Marks	CO	BL
1.	Define computer. Explain any five characteristics of a digital computer.	[4]	CO1	Remember
2.	What are the factors to consider when categorizing computer? Explain categories of Computer.	[1+5=6]	CO1	Understand
3.	What do you mean by bus in digital computer systems? Explain types of buses and their uses in computer systems.	[3]	CO1	Understand
4.	What are the types of memory used in computer systems? Explain. Define different types of read-only memory.	[4+2=6]	CO2	Remember
5.	Explain the working of a magnetic disk. Define the terms <i>seek time</i> , <i>latency time</i> , <i>data transfer rate</i> and <i>access time</i> .	[2+2=4]	CO2	Understand
6.	Differentiate the followings: a) Static RAM and Dynamic RAM b) Human data entry and source data entry devices	[1+1=2]	CO2	Remember
7.	Answers the following questions: a) Suppose you want to open MS Word application program on your computer system. Write down the steps followed by a computer system from clicking an icon to get the GUI of MS Word. b) What is cache memory? How many levels of cache memory are being used by today's processor? Is any necessity for such kind of memory in the computer system? If yes, then why, Explain. c) What do 64-bit processor and 64-bit memory mean for your computer? Explain its meaning.	[1+2+2=5]	CO2 CO1 CO2	Apply Analyze Analyze

All the best

NATIONAL INSTITUTE OF TECHNOLOGY PATNA
Department of Computer Science and Engineering
END SEMESTER EXAMINATION, Jul-Dec 2022

B.Tech.: CSE, 1st Semester

Course Name: Information Technology Workshop

DOE: 28/02/2023

Course Code: CS14106

Max. Marks: 60

Maximum Time: 3 hours

Instruction:

1. Attempt all questions.
2. Assume any suitable data, if necessary.
3. The Marks, CO (Course Outcome), and BL (Bloom's Level) related to questions are mentioned on the right-hand side margin.

S.N.	Questions	Marks	CO	BL
1.	Draw the computer system interaction diagram and give a brief introduction of its components.	[2+3=5]	CO1	Remember
2.	What is a Register? Explain the characteristics of different types of registers in the CPU.	[1+5=6]	CO2	Understand
3.	Explain the working of the I/O system.	[4]	CO1	Understand
4.	What do you mean by the term network? Describe the following network types briefly. (a) LAN (b) MAN (c) WAN	[1+6=7]	CO2	Remember
5.	Briefly describe the following network devices and their features: (a) repeater (b) hub, (c) switch, (d) bridge, (e) router	[2*5=10]	CO2	Remember
6.	Briefly discuss the followings: (a) Computer Security and types of security attacks (b) Firewall and its topologies	[4+4=8]	CO5	Remember
7.	Differentiate the following briefly: a) Volatile and non-volatile memory b) Software and Hardware c) Virus and Worms d) Reactive and Proactive security strategies e) Analog and digital computer	[1*5=5]	CO2	Understand
8.	Answers the following questions: a) Suppose you want to install application software on your system. When you search about the internal architecture of the processor. You get to know that your processor has a data bus of 16 bits, an address bus of 18 bits, and registers of the size of 16 bits. Now, how many bits of software do you need to install on your system and how much memory can be supported by your system? Explain briefly. b) A company has two branches in two different cities and established two different modes of communication M1 and M2. In mode M1, company personnel uses some token-passing mechanism to make the communication synchronous so that the person having the token is allowed to send the information. In mode M2, company personnel are allowed to share their information without any restrictions. Identify the mode of communications used in modes M1 and M2 respectively.	[2.5+2.5=5]	CO2	apply

END SEMESTER EXAMINATION FEB-2023
DEPARTMENT OF MATHEMATICS
NATIONAL INSTITUTE OF TECHNOLOGY PATNA

Course Title: ENGINEERING MATHEMATICS (MA14102)
Branch- CSE - I & II

Time: 3 hrs.

Maximum Marks: 60

Answer any eight questions. All questions are of equal value.

1. Test the convergence of the series $\sum \frac{(n!)^2}{(2n)!} x^{2n}$

2. Show that the function

$$f(x, y) = \begin{cases} \frac{x^3+2y^3}{x^2+y^2} & \text{if } (x, y) \neq (0, 0) \\ 0 & \text{if } (x, y) = (0, 0) \end{cases}$$

is continuous at $(0, 0)$ and possesses partial derivatives $f_x(0, 0)$ and $f_y(0, 0)$.

3. If $u = \cos^{-1} \frac{x+y}{\sqrt{x+\sqrt{y}}}$, show that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + \frac{1}{2} \cot u = 0$

4. Expand $x^2y + 3y - 2$ in the power series about the point $(1, -2)$ using Taylor's Theorem.

5. Find the shortest distance between the line $y = 10 - 2x$ and the ellipse $\frac{x^2}{4} + \frac{y^2}{9} = 1$.

6. Solve $\frac{d^2y}{dx^2} + a^2y = \sec ax$

7. Using method of variation of parameters, solve $\frac{d^2y}{dx^2} + 4y = \tan 2x$

8. Solve $x^2 \frac{d^2y}{dx^2} + x \frac{dy}{dx} + y = \log x \cdot \sin(\log x)$

P.T.O

9. Solve the simultaneous equations

$$\frac{dx}{dt} + 4x + 3y = t$$

$$\frac{dy}{dt} + 2x + 5y = e^t$$

10. Show that $(1 - 2xt + t^2)^{-\frac{1}{2}} = \sum_{n=0}^{\infty} t^n P_n(x)$

Time = 3 hours

P. H = 60.

National Institute of Technology

End Sem Exam 2022 (July-Dec)

Branch : B.Tech (CSE-A)

Sub : Engineering Chemistry

Code : CH14101

Answer all questions:

4+4+4+3=15

[CO₁]

1) (a) How can you determine percentage of nitrogen by Ultimate Analysis.

(b) Determine flue gas analysis by Orsat's apparatus.

(c) 3.12 g of the coal was kjeldahlized and ammonia gas thus evolved was absorbed in 50 ml of $(\frac{N}{10})$ H₂SO₄. After absorption, the excess (residual) acid required 12.5 ml of $(\frac{N}{10})$ NaOH for exact neutralization. Determine percentage of nitrogen in the sample of coal.

(d) Calculate the gross and Net calorific value of a coal sample having the following composition: C = 80%, H = 7%, O = 3%, S = 3.5% and ash = 4.4%, N = 2.1%.

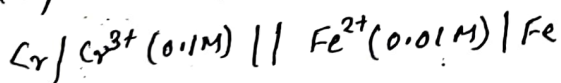
3+4+4+4=15

[CO₂]

2) (a) Explain Conductance, Specific Conductance and Equivalent Conductance.

(b) The equivalent conductances of Sodium acetate, Hydrochloric acid, and Sodium chloride at infinite dilution are 91.0, 426.16 and 126.45 ohm⁻¹ cm² equiv⁻¹ respectively at 25°C. Calculate equivalent conductance at infinite dilution for acetic acid.

(c) Calculate potential of the cell:

Given $E^\circ_{\text{Cr}^{3+}/\text{Cr}} = -0.74\text{V}$.& $E^\circ_{\text{Fe}^{2+}/\text{Fe}} = -0.44\text{V}$

(d) Calculate the equilibrium constant at 298 K for the reaction taking place between Copper sulphate and Aluminium.

Given $E^\circ_{\text{cell}} = 2.0\text{V}$ & antilog of 0.39 = 2.5

3+3+3+3=15

[CO₂]3) (a) Explain O₂ is paramagnetic by Molecular Orbital Theory.

(b) Write Molecular Orbital Diagram of CO.

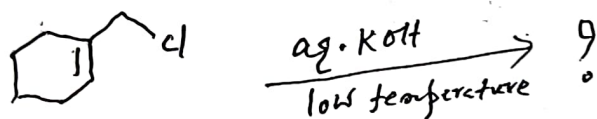
(c) Explain magnetic character, magnetic moment and stability of Ni^{2+} ion.(d) For Mn^{3+} ion, $P = 28,000\text{ cm}^{-1}$, Δ_o for $[\text{Mn}(\text{CN})_6]^{3-}$ is $38,500\text{ cm}^{-1}$. Does this complex has high spin or low spin state?

② A metal ion has d^5 configuration. Calculate its CFSE in low spin state and high spin state. $3+3+3+3+3=15$ CO₄

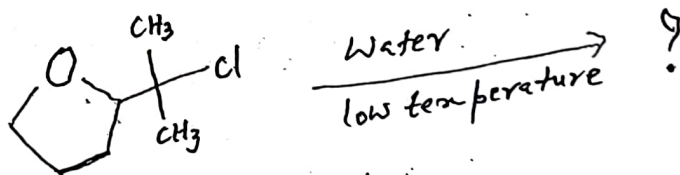
④ (a) Write reaction mechanism of hydration reaction by hydroboration.

(b) Explain E'_{CB} reaction.

(c) Write reaction mechanism & most stable product of the following:



(d) Write reaction mechanism and most stable product of the following:



⑥ When 1-bromo-2,2-dimethylcyclopentane is heated at high temperature in ethanol, which product is produced? Also write its reaction mechanism.

NATIONAL INSTITUTE OF TECHNOLOGY PATNA
Department of Electronics and Communication Engineering
END SEMESTER EXAMINATION, MARCH 2023

1ST Semester Regular Examination: MARCH 2023

SUBJECT NAME: DIGITAL DESIGN

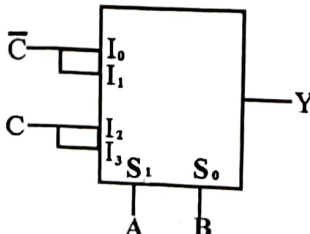
SUBJECT CODE: EC14102

Time: 03 Hours

Max Marks: 60

Instructions:

1. All questions are compulsory
2. Assume any suitable data if necessary
3. The CO (Course Outcome) and Level (from Bloom's Taxonomy) related to questions are given in the left-hand side and Marks are mentioned on the right-hand side margin.

Q No.	CO	Level	Questions	Marks
Q1	CO1, CO2, CO3, CO4, CO5	1,2,3	<ol style="list-style-type: none"> Define duality property. Difference between encoder and decoder What is the operation of D flip-flop? Design XNOR and XOR Gates using Universal Gates. Define Multiplexer and applications of multiplexer? Compare static RAM and dynamic RAM Difference between Fixed point and Floating point Define Arithmetic logic unit (ALU). 	16
Q2	CO1, CO2, CO3, CO4	1,2,3	<ol style="list-style-type: none"> Explain the Logic diagram of JK flip-flop? Write difference between Combinational & Sequential circuits? Write the differences between latches and flip flops? Explain The Half adder? Implement the full adder using two half adders. 	12
Q3	CO1, CO2, CO5	1,2,5	<ol style="list-style-type: none"> Simplify the Boolean expressions to minimum number of literals <ol style="list-style-type: none"> $(A+B)(A+C')(B'+C')$ $AB+(AC)'+AB'C(AB+C)$ $(A+B)'(A'+B)'$ Obtain the simplified expression in POS (product of sums) of $F(w,x,y,z) = \pi(1,2,4,7,12,14,15)$ using K-maps. Implement the function $F(a,b,c) = \sum(1,3,4,6)$ using NOR-NOR two level gate structure. Obtain the set of prime implicants for $\sum m(3,7,11,12,13,14,15)$ using the binary designations of minterms. 	12
Q4	CO3, CO2, CO5,	1,2,3	<ol style="list-style-type: none"> Describe the operation of 3-bit Asynchronous up counter with Truth Table and Logic Diagram Design a Mod 6 Down synchronous counter using J K flip-flop. Compare Mealy and Moore state machine models with example. 	12
Q5	CO1, CO2, CO5, CO5	1,2,3, 5	<ol style="list-style-type: none"> Determine minimized logical expression for given MUX Circuit :- <div style="text-align: center;">  </div> Design a Octal to binary Encoder(8X3). 	8



NATIONAL INSTITUTE OF TECHNOLOGY PATNA
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

End Semester Examination July – Dec 2022

B. Tech 1st Semester

Course Name: Programming in C

Course Code: CS14102/CS17101/CS18101

Maximum Time: 3Hours

Max. Marks: 60

Instruction: All questions are compulsory (except question no. 5 has two options) and sub-questions must be answered sequentially at one place.

S.N.	Questions	Marks	CO	BL
1.	Write the output of following code snippets with suitable explanations (Assume the code is correct).	a) 3 b) 3 c) 2 d) 2 e) 2 f) 4 g) 4	CO2, CO3, CO4, CO5	Understand, Analyze, Evaluate, and Apply
	a) #include <stdio.h> int main () { int a [] = {2,4,6,8,10}; int i, sum=0, *b=a+4; for (i=0; i<5; i++) sum= sum+ (*b-i) - *(b-i); printf ("%d\n", sum); return 0; }	b) int fn(int x, int *py, int **ppz){ int y, z; **ppz += 1; z = **ppz; *py += 2; y = *py; x += 3; return x+y+z; } void main () { int c, *b, **a; c = 4; b = &c; a = &b; printf ("%d, %d", fn(c, b, a), c); }		
	c) What would be the equivalent pointer expression for referring the array element a[i][j][k][l]?			
	d) What is the value of sizeof(a) / sizeof(char *) in a code snippet: Assume memory required to store an address is 8 bytes. char *a[4] = {"sridhar", "raghava", "shashi", "srikanth"};	f) #include <stdio.h> int r(){ static int num=7; return num--; } int main(){ for (r(); r(); r()) printf ("%d", r()); return 0; }		
	e) #include <stdio.h > int x=0; void p(int, int); void main (){ int x = 1; p(x, x); } void p(int y, int z){ x = x+1; y = y+1; z = z+ 1; printf ("%d\n", x+y+z); }	g) #include<stdio.h> int main(){ int x=3; int const *ptr =&x; printf ("%d", ++x); printf ("\n %d", ++*ptr); return 0; }	[3+3+2+2+2+4+4 = 20]	



NATIONAL INSTITUTE OF TECHNOLOGY PATNA
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

End Semester Examination July – Dec 2022

B. Tech 1st Semester

Course Name: Programming in C

Course Code: CS14102/CS17101/CS18101

Maximum Time: 3Hours

Max. Marks: 60

2.	<p>a) What is recursion? Write a program to generate Fibonacci series using recursive function.</p> <p>b) Write a program to create a record named companyEmp, which contains the details of the employees. The record having the fields such as <i>name</i>, <i>address</i>, <i>phone</i> and <i>salary</i>. Read the details of 10 employees from the user <i>and</i> display the records.</p>	<p>5</p> <p>5</p> <p>[5+5 = 10]</p>	<p>CO2</p> <p>CO5</p>	<p>Understand, Analyze, Create, and Apply</p>
3.	<p>a) Illustrate the storage of a two-dimensional array in memory using a suitable diagram.</p> <p>b) What are basic syntax rules need to follow for <i>definition</i> and <i>calling</i> of a function?</p> <p>c) Write a short note on string handling functions (including at least four) that C language supports.</p>	<p>4</p> <p>4</p> <p>4</p> <p>[4+4+4 = 12]</p>	<p>CO2, CO3</p>	<p>Remember</p>
4.	<p>a) How to pass structure members as arguments to a function? Illustrate it with an example.</p> <p>b) How iteration differ from recursion in C?</p> <p>c) Why the concept of scope is important in C language?</p>	<p>5</p> <p>3</p> <p>2</p> <p>[5+3+2 = 10]</p>	<p>CO2, CO3, CO5</p>	<p>Understand</p>
5.	<p>Differentiate between the following:</p> <p>a) malloc() and calloc()</p> <p>b) Internal static and external static variable</p> <p>c) structure and union</p> <p>d) break and continue statements</p> <p style="text-align: center;">OR</p> <p>Differentiate between the following:</p> <p>a) fopen() and fclose()</p> <p>b) Text and binary files</p> <p>c) fscanf() and fread()</p> <p>d) fgets() and fputs()</p>	<p>3</p> <p>2</p> <p>2</p> <p>1</p> <p>3</p> <p>2</p> <p>2</p> <p>1</p> <p>[3+2+2+1 = 8]</p>	<p>CO4, CO5</p>	<p>Remember and Understand</p>

All the best