Indian Institute of Information Technology Una
An institute of National Importance under MoE.
Saloh, Una (HP)-177209.

AY 2022-23
School of Computing
Curriculum: IIITUGCSE22
End Semester Exam
August 21, 2023

Degree	B.Tech.
Branch	CSE
Semester	II
Subject code/name	MAC211/Probability and Random Process
Time	180 minutes
Maximum Marks	100

Answer all the questions.

Q. No.	Questions	Marks
1(a)	An urn contains 3 red marbles and 7 white marbles. A marble is drawn from the urn and a marble of the other color is then put into the urn. A second marble is drawn from the urn. Find the probability p that the second marble is red.	5
1(b)	A pair of fair dice is thrown. If the two numbers appearing are different, compute the probability p that the sum is six.	5
1(c)	Determine the standard deviation for a random variable X whose moment generating function (MGF) is given by: $M_X(t) = \frac{3}{3-t}$.	5
1(d)	The probability density function of a random variable X is given by $f_X(x) = \begin{cases} \frac{1}{8}, & \text{for } 0 \le x \le 8 \\ 0, & \text{otherwise} \end{cases}$. Find the probability $P(3 \le X \le 7)$.	5
2(a)	The mathematics department has 8 graduate assistants who are assigned to the same office. Each assistant is just as likely to study at home as in the office. How many desks must there be in the office so that each assistant has a desk at least 90% of the time?	5
2(b)	Suppose 300 misprints are distributed randomly throughout a book of 500 pages. Find the probability that a given page contains 2 or more misprints.	5
2(c)	A fair die is tossed. Let X denote twice the number appearing, and let Y denote 1 or 3 if an odd or an even number appears, respectively. Construct the distribution for the random variable $X + Y$.	5

2(d)	The mileage which car owners get with a certain kind of radial tire is a random variable having an exponential distribution with mean 40,000 km. Compute the probabilities that one of these tires will last for at least 20,000 km.	5
3(a)	A fair coin is tossed three times. Let X denote 0 or 1 if a head or a tail occurs on the first toss, respectively, and let Y denote the number of heads which occur. Determine the joint distributions of X and Y.	5
3(b)	For the random variables defined in question 3(a), find the covariance $Cov(X, Y)$.	5
3(c)	If the joint probability density function of (X, Y) is given by $f_{XY}(x, y) = x+y$; $0 \leq x, y \leq 1$, construct the probability density function of $U = XY$.	5
3(d)	State the central limit theorem. If 10 dice are rolled, use central limit theorem to find the approximate probability that the sum is obtained between 30 and 40.	5
4(a)	What is a wide-sense stationary random process? If $\{X(t)\}$ is a wide-sense stationary process with auto-correlation $R(\tau) = 5e^{-4\|\tau\|}$, find the second-order moment of the random variable $X(10)-X(7)$.	5
4(b)	Compute the auto-covariance of the Poisson process.	5
4(c)	A gambler has ₹3/-. At each play of the game, he loses ₹1/- with probability 3/4, but wins ₹2/- with probability 1/4. He stops playing if he has lost his initial amount of ₹3/- or he has won at least ₹3/-. Develop the transition probability matrix of the associated Markov chain.	5
4(d)	Consider a Markov chain with three states $S = \{1, 2, 3\}$, that has the following transition probability matrix: $$P = \begin{bmatrix} 1/2 & 1/4 & 1/4 \\ 1/3 & 0 & 2/3 \\ 1/2 & 1/2 & 0 \end{bmatrix}.$$ Given that $P\{X_0 = 1\} = P\{X_0 = 2\} = 1/4$, find $P\{X_0 = 3, X_1 = 2, X_2 = 1\}$.	5
5(a)	For the queueing model M/M/1:∞/FIFO, compute the probability that the number of customers in the system exceeds k.	5
5(b)	Customers arrive at a shop with only one counter, according to a Poisson process with a mean interarrival time of 12 minutes. Customers spend an average of 10 minutes at the counter. (i) What is the expected number of customers at the counter and in the queue? (ii) Calculate the percentage of time an arrival can walk straight to the counter without having to wait. (iii) How much time can a customer expect to spend in the shop? (iv) Management will provide another counter and hire another worker, when a customer's waiting time in the shop exceeds one hour and 15 minutes. How much must the average rate of arrivals increase to warrant a second worker?	5

5(c)	Patients arrive at a clinic according to Poisson distribution at a rate of 30 patients per hour. The waiting room does not accommodate more than 14 patients. Examination time per patient is exponential with mean rate of 20 per hour. (i) Find the effective arrival rate at the clinic. (ii) What is the probability that an arriving patient will not wait for service? (iii) What is the expected waiting time until a patient is discharged from the clinic?	5
5(d)	Compute the results in question 5(c), if the patients arrive at the rate of 20 patients per hour and rest remains the same.	5

******* All the best*******

21112

INDIAN INSTITUTE OF INFORMATION TECHNOLOGY UNA [HP]

An Institute of National Importance under MoE

Saloh, Una (HP) – 177 209

Website: www.iiitu.ac.in

School of Computing
CURRICULUM: IIITUGCSE20
End Sem Examination
24-08-2022

Degree	B. Tech.	**Branch**	CSE
Semester	II		
Subject Code & Name	CSC203-Basics of Programming in C		
Time: 03 Hours	**Answer All Questions**		**Maximum: 100 Marks**

Sl. No.	Question	Marks
1.a.	i. What is the need of compiler? Briefly explain how C programs are compiled. ii. Differentiate compiler and interpreter.	(5=2.5+2.5)
1.b	i. What is structured programming? ii. Briefly explain the different programming languages.	(5=2.5+2.5)
1.c	Design a flowchart to find the first 100 prime numbers.	(5)
1.d	What is an algorithm? Briefly explain the characteristics of algorithm.	(5)
2.a	Illustrate, how to perform type casting. Also explain the need of type casting.	(5)

2.b	Describe the output of the following code:
	i.
	`#include <stdio.h>`
	`int main(void)`
	`{`
	`int i = 40 >> 5 << 3 >> 2 << 1;`
	`printf("%d", i);`
	`return 0;`
	`}`
	
	ii.
	`#include <stdio.h>`
	`int main(void)`
	`{`
	`int a;`
	`int b = 1;`
	`int x[5] = { 1, 2, 3, 4, 5 };`
	`a = 5 * 4 + x[b++] - (9 / b);`
	`printf("%d", a);`
	`return 0;`
	`}`
		(5=2.5+2.5)

<table>
<tr><td>2.c</td><td>What are the different operators in C? Illustrate the use of conditional operator and logical operators with example.</td><td>(5)</td></tr>
<tr><td>2.d</td><td>i. Illustrate, how the getchar function be used to read multicharacter strings?
ii. Differentiate getc and scanf function.</td><td>(5=2.5+2.5)</td></tr>
<tr><td>3.a</td><td>Write a loop that will examine each character in a character-type array called text and determine how many of the characters are letters, how many are digits, how many are whitespace characters. Assume that text contains 80 characters.</td><td>(5)</td></tr>
<tr><td>3.b</td><td>Find the output of the following code:

i.
#include <stdio.h>
void main( )
{
int i,j, k, x = 0;
for (i = 0; i< 5; ++i)
for (j = 0; j < i;++j) {
k = (1 + j - 1);
if (k % 2 == 0)
x += k;
else
if (k % 3 == 0)
x += k - 2;
printf("%d ", x);
}
printf ("\nx = %d",x) ;
}

ii.
#include <stdio.h>
int main()
{
int x = 1;
switch (x)
{
case '0': printf("Red");
break;
case '1': printf("Green");
break;
case '2': printf("White");
break;
default: printf("Black");
}
return 0;
}</td><td>(5=2.5+2.5)</td></tr>
<tr><td>3.c</td><td>Explain the use of following statements with example:
i. goto statement
ii. continue statement.</td><td>(5=2.5+2.5)</td></tr>
<tr><td>3.d</td><td>What is a pointer variable? Explain the benefits of passing pointers to a function.</td><td>(5)</td></tr>
</table>

4.a	Design a function locate() that takes two character arrays s1 and s2 and one integer value m as parameters and inserts the string s2 into s1 immediately after the index m.	(5)

4.b	Describe the output of the following code:
	
	i.
	#include <stdio.h>
	int a = 300, b = 100;
	int functl(int a, int b);
	void main( )
	{
	int count, c, d;
	for (count = 1; count <= 5; ++count) {
	c = 20 * (count - 1);
	d = 4 * count * count;
	printf("%d %d ", functl(a, c), functl(b, d));
	}
	}
	int functl (int x, int y)
	{
	return(x - y);
	}
	
	ii.
	#include <stdio.h>
	int prod(int m, int n);
	main ( )
	{
	int x = 10;
	int y = 20;
	int p, q;
	p = prod (x,y);
	q = prod (p, prod (x,y));
	printf ("%d %d\n", p,q);
	}
	int prod(int a, int b)
	{
	return (a * b);
	}
		(5=2.5+2.5)

4.c	If an array is passed to a function and several of its elements are altered within the function, are these changes recognized in the calling portion of the program? Explain.	(5)
4.d	Write a function to concatenate three strings without using library function.	(5)
5.a	Describe with an example, how to pass an entire structure to a function and accessing the members of the structure variable?	(5)
5.b	Design pseudo code for a C program that reads several different names and addresses into the computer, rearranges the names into alphabetical order, and then writes out the alphabetized list using structure variables.	(5)
5.c	Describe how to open a file and the different functions to read from and write into files.	(5)
5.d	Write pseudo code to copy the contents of a file to another file.	(5)

21/12,

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AY 2021-22
School of Computer Science and Engineering
CURRICULUM: IIITUGCSE20
END-SEM EXAM
26th August 2022

Degree	B. Tech.	**Branch**	CSE
Semester	II		
Subject Code & Name	ENC 204: Communication Skills		
Time: 3 Hours	**Answer All Questions**		**Maximum: 100 Marks**

S. No.	Question	Marks
1.a.	Change the **voice** of the following sentences: i. Shreya Ghosal sings beautiful songs. ii. The people were helping the wounded woman. iii. Kulwant gave me a book. iv. He acted upon my advice. v. His work satisfied me.	5
1.b.	Explain the meaning of the **idioms** in the following sentences. i. The results of the election dashed my hopes. ii. The dog was asleep when the sheep ran riot. iii. Our postman has lost his marbles, every day he drops Mr. Kabir's mail at our door. iv. You have cried wolf so many times that no one believes you now. v. Rattan always beat around the bush which makes the whole discussion pointless.	5

1.c.	Define and Differentiate between Homophones, Homonyms and Homographs with examples.	5
1.d.	Fill in the blanks with the appropriate word. 1. The old man's_____ surprised everyone. A. longitudinal B. loiter C. longevity D. lonesome 2. Holograms _____ real images very convincingly. A. singular B. similitude C. sinecure D. simulate 3. "Could you help your mother with that?" "I _____ do it in the afternoon." A. must have B. will C. ought to be D. would 4. What a _____ story! A. surprising B. credible C. surprise D. incredible 5. I can't help ___ you about it. A. to tell B. telling C. having told D. having been told	5
2.a.	Read the following sentences and rewrite without errors. If there are no errors, you may write "no errors" as your answer. i. I'm believing what you're saying about Kavita. ii. When you told him the story? iii. John and Mary is waiting for you outside in the hallway. iv. Who is the fellow whom helped you to find the answer?	5

	v. I really wish you would stop doing that.	
2.b.	Fill an appropriate phrasal verb in the following sentences. i. The vending machine in the corner is damaged. It looks like someone_____ with a hammer or something. That person must have been really thirsty. ii. Peter was kicked off the football team because he didn't _____to the coach's expectations. iii. Paul _____Elizabeth's letter and threw it in the dustbin. iv. The airport security personnel asked Michael to _____his pockets. v. Ella _____ the letter after she read it.	5
2.c.	Following is a conversation between Matt and Mary who meets each other at a workshop. Convert the conversation into **reported speech**. *Matt: Mary, are your sons on a hockey team this year? I'd like to get my son involved this season.* *Mary: Both of my boys are on teams at the Phoenix Sports Complex. I should warn you that it costs 12000 per child for the season.* *Matt: 12000? Oh, that's not too bad! I paid more than that for basketball last year.* *Mary: Sure. But remember that you'll have to pay another 3000 for equipment!* *Matt: Equipment! Of course! I'd forgotten that hockey is not quite as simple as basketball. Thanks, Mary. Now I'll have a better idea of how expensive it is going to be.* *Mary: Glad to help. Oh! Hold on! I might be able to help you even more! What size does your son need? My youngest boy can't use his old size 12 gear any more.* *Matt: Really? Size 12 is exactly what we need!* *Mary: Okay, I'll tell you what. If you can come by my house after dinner tonight, your son can try on the equipment.* *Matt: Thank you, Mary! That would be great! We'll see you tonight.*	5
2.d.	Read the following passage and write an accurate, brief and clear **Precis** reducing it to approximately one third of its word count, but not omitting any important fact or information. The following article is of 600 words. Your Precis should not exceed **200 words**. *Knots of dead snakes had washed ashore, as the flooded Bramhaputra waters receded. As a teenaged Payeng walked the sun-baked shore, the sight of these snakes getting fried by the sun made him worry: What if this happens to people? Payeng doggedly funnelled his fears in to transforming that fallow land into a 550-hectare, biome in Majuli, Assam—one tree at a time.*	5

	"I started planting trees in 1979. The Deori community elders told me if I wanted to prevent snakes from dying, I should plant the world's tallest grass. I didn't know then; they meant bamboo. They gave me 50 bamboo seeds and 25 saplings, and that's how this began." Payeng knew simply sowing a seed, didn't mean it would sprout and thrive. The bamboo plants needed water. "I bought 50 earthen pots, poked holes in each and used them to water the plants. I would go fill them up every five days." *As the waters of the Brahmaputra brought plants and seeds downstream and washed them ashore, Payeng would sift through the debris and plant them on the sandbar as well. Soon, he was collecting seeds from the locals and planting them. "I have to acknowledge all the help I have gotten from my village. The elders have such an intimate relationship with the natural world, and so much knowledge. They lived without disturbing the balance with nature. When I was struggling to keep my trees healthy, they told me that Amroli (red) ants can help. So, I would collect them in a sack and carry them to the sandbar. This is the kind of practical knowledge we need to pass on to our young." Payeng grew up around men who passed on a love for the environment and encouraged him. "As a kid, I used to be asked to plant paan during Bohag (April)—the ones I planted would always flourish. Not everyone can grow paan, you know," he says. "I would get 25 paise per plant. Then, 25 paise would buy you 1.5 kgs of peanuts—I was motivated by that greed," he says, laughing.* *One day, as he was on this errand a family friend took his hand, turned over his palm and told him, his lines were auspicious. "He told me to continue this work for life and I would become someone good in life."* *Prophecy or not, Payeng—known to most by the nickname 'Molai'—continues his work. Every day at dawn the 62-year-old sets out for his forest. Mola'r Forest—as the locals fondly call it in honour of its creator–caretaker—bursts with varied flora and fauna, including 1,000 deer, several species of migratory birds and leopards. It's also a refuge for rhinos during the region's annual floods and an elephant corridor. He is currently working on a 200-hectare green cover, a project he started in 2011, with the help of the administration. "This will be done in 20 years," he says.* *After a 2010 news report brought him media attention, multiple awards and recognition followed. He was also awarded the Padma Shri in 2015. Payeng has recently signed an agreement with FundaciÓn Azteca, a Mexican non-profit organization, to collaborate on environmental work in the north American country. Having never expected fame, he says "I grew up loving nature—clear blue skies, tall trees, birds and animals. I tell everyone: It is not human beings who changed my life. It's the trees that have put clothes on my back, birds who have taken me across seven seas, from the land where the sun rises first, to where the sun sets last."*	
3.a.	What is Non-verbal Communication? Explain the four components with examples.	5

3.b.	List five barriers to communication and illustrate them with examples	5
3.c.	The Literary Club will hold its fifth meeting on 27th August. The agenda is to organize a Public Speaking workshop. Assuming you are the Secretary of the Literary Club, draft a **Notice** for the meeting.	5
3.d.	Assume that the afore-mentioned of the Literary Club has taken place. The club has approved the proposal to hold a Public Speaking workshop. They intend to invite a prominent television anchor and conduct a TED Talk. Assuming you are the Secretary of the Literary Club, draft a post-dated **Minutes** of the aforementioned Meeting.	5
4.a.	You live in a hostel room which you share with another student. There are many problems with this arrangement, and you find it difficult to study. Write a **letter** to the Hostel warden at the college notifying him of the issue. In the letter, describe the situation, explain the problems, and how you would like the situation resolved.	5
4.b.	Suppose you discuss the following case in a Group Discussion. There are four possible solutions to the problem/situation. You reject three of them and accept only one. **Write as you will speak** in the GD to comment on the effects of the proposals that you reject and give reasons for the one you accept. *XYZ company is a reputed car manufacturer of Europe. It introduced their most basic model (a 999 cc petrol car) in India at a price of 2,70,000, about 6 months ago. This is close to the Maruti Alto LX Model. However, the sales of the car is very discouraging. The company could sell only 1200 units from the total 25,000 units manufactured for India this year. What should the company management do?* i. The company should stop further production of the car. ii. The company should reduce the price of the car iii. The company should send the remaining 13,800 units of the car to Europe. iv. The company should intensify the publicity campaign for the car.	5
4.c.	Describe the 5 techniques of Presentation delivery which can capture the attention of the viewers.	5

4.d.	List 5 phrases which can be used to express your agreement and disagreement during a debate. Illustrate the phrases in sentences of your own.	5
5.a.	Highlight the importance of eye contact and confidence level during a group discussion.	5
5.b.	Draft a telephonic conversation of at least 400 to 500 words between a student and the Dean, requesting the Dean of his/her college to sanction funds for the Fresher's Party.	5
5.c.	Read the statement or passage and then choose the best answer to the question. Answer the question based on what is stated or implied in the statement or passage. 1. In the words of Thomas DeQuincey, "It is notorious that the memory strengthens as you lay burdens upon it." If, like most people, you have trouble recalling the names of those you have just met, try this: The next time you are introduced, plan to remember the names. Say to yourself, "I'll listen carefully; I'll repeat each person's name to be sure I've got it, and I will remember." You'll discover how effective this technique is and probably recall those names for the rest of your life. Q) The main idea of the paragraph maintains that the memory A. always operates at peak efficiency. B. breaks down under great strain. C. improves if it is used often. D. becomes unreliable if it tires. 2. Unemployment was the overriding fact of life when Franklin D. Roosevelt became president of the United States on March 4, 1933. An anomaly of the time was that the government did not systematically collect statistics of joblessness; actually, it did not start doing so until 1940. The Bureau of Labor Statistics later estimated that 12,830,000 persons were out of work in 1933, about one-fourth of a civilian labor force of more than 51 million. Roosevelt signed the Federal Emergency Relief Act on May 12, 1933. The president selected Harry L. Hopkins, who headed the New York relief program, to run FERA. A gifted administrator, Hopkins quickly put the program into high gear. He gathered a small staff in Washington and brought the state relief organizations into the FERA system. While the agency tried to provide all the necessities, food came first. City dwellers usually got an allowance for fuel, and rent for one month was provided in case of eviction. This passage is primarily about A. unemployment in the 1930s. B. the effect of unemployment on United States families.	5

	C. President Franklin D. Roosevelt's presidency. D. President Roosevelt's FERA program. 3. It is said that a smile is universally understood. And nothing triggers a smile more universally than a taste of sugar. Nearly everyone loves sugar. Infant studies indicate that humans are born with an innate love of sweets. Based on statistics, a lot of people in Great Britain must be smiling because on average, every man, woman, and child in that country consumes 95 pounds of sugar each year. From this passage it seems safe to conclude that the English A. do not know that too much sugar is unhealthy. B. eat desserts at every meal. C. are fonder of sweets than most people. D. have more cavities than any other people. 4. With varying success, many women around the world today struggle for equal rights. Historically, women have achieved greater equality with men during periods of social adversity. The following factors initiated the greatest number of improvements for women: violent revolution, world war, and the rigors of pioneering in an undeveloped land. In all three cases, the essential element that improved the status of women was a shortage of men, which required women to perform many of society's vital tasks. We can conclude from the information in this passage that A. women today are highly successful in winning equal rights. B. only pioneer women have been considered equal to men. C. historically, women have only achieved equality through force. D. historically, the principle of equality alone has not been enough to secure women equal rights. 5. In 1848, Charles Burton of New York City made the first baby carriage, but people strongly objected to the vehicles because they said the carriage operators hit too many pedestrians. Still convinced that he had a good idea, Burton opened a factory in England. He obtained orders for the baby carriages from Queen Isabella II of Spain, Queen Victoria of England, and the Pasha of Egypt. The United States had to wait another 10 years before it got a carriage factory, and only 75 carriages were sold in the first year. Even after the success of baby carriages in England, A. Charles Burton was a poor man. B. Americans were still reluctant to buy baby carriages. C. Americans purchased thousands of baby carriages. D. the United States bought more carriages than any other country.	
5.d.	Differentiate between Upward, Downward and Diagonal Communication with examples	5

Good Luck!

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School of Basic Sciences
CURRICULUM: IIITUGCSE20
End Semester Examination
25 Aug.'22

Degree	B. Tech.	**Branch**	CSE
Semester	Second		
Subject Code & Name	EVC205: Basic Environmental Science and Engineering		
Time: 180 Minutes	**Answer All Questions**		**Maximum: 100 Marks**

Sl. No.	Question	Marks
1.a	What are the social impacts of thermal power plants?	(5)
1.b	Explain briefly the environmental impacts of hydro power plants.	(5)
1.c	What are the economic impacts of hydro power plants?	(5)
1.d	Illustrate the important aspects of energy savings in industry.	(5)
2.a	Model the working of liquid type flat plate collector with the help of diagram.	(5)
2.b	Plan the various biomass conversion technologies for manufacturing fuels from biomass.	(5)
2.c	Build a block diagram for constant speed – constant frequency system for electric generation.	(5)
2.d	Develop the schematic diagram of closed cycle Ocean Thermal Energy Conversion power plant.	(5)
3.a	Summarize an abiotic environment with example.	(5)
3.b	Discuss the effects of acid rain.	(5)
3.c	Explain the ten percent law of transfer of energy using the example of terrestrial food chain.	(5)
3.d	Outline the pyramid of biomass in an aquatic ecosystem.	(5)
4.a	How the resolution and magnification power of electron microscopy is better than the light microscopy for visualization of environmental microbes?	(5)
4.b	List the major kinds of microbial characteristics and indicate those that must be determined by examination of individual cells.	(5)
4.c	If two microorganisms have an identical mol % G + C value for their DNA, are they necessarily related? Explain.	(5)
4.d	List several different staining techniques and describe their particular applications.	(5)

5.a	What is biosensor? Explain their working principles exploited for environmental health benefits with suitable examples.	(5)
5.b	Model the working of sewerage plant employed for wastewater treatment and discuss the outcome of final treated product.	(5)
5.c	List the advantage of bio fertilizer and illustrate the process of bio fertilizer commercialization at the small scale level.	(5)
5.d	Outline the working mechanism of three treatments employed for the environmental cleanliness namely bioremediation, physical, and chemical.	(5)

**** GOOD LUCK *****