Indian Institute of Information Technology Una [HP]
An Institute of National Importance under MoE
Saloh, Una (HP) – 177 209
Website: www.iiitu.ac.in

AY 2022-23
School of Basic Sciences
CURRICULUM: IIITUGCSE22
Cycle Test – II
18, Jul.'23

Degree	B. Tech.	**Branch**	CSE
Semester	II		
Subject Code & Name	EVC205: Basic Environmental Science and Engineering		
Time: 60 Minutes	**Answer All Questions**		**Maximum: 20 Marks**

Sl. No.	**Question**	**Marks**
1.a	Differentiate between the green belt and brown belt of the ecosystem.	(1)
1.b	Classify the types of species and their roles in the ecosystem with examples.	(2)
1.c	Illustrate the ten percent law of transfer of energy with a suitable diagram.	(2)
2.a	Compare the viable and non-viable particulate pollutants	(1)
2.b	Illustrate the effects of greenhouse gases and their control measures to reduce the rate of global warming.	(2)
2.c	Explain briefly the production and consequences of acid rain.	(2)
3.a	How is the BOD value correlated with the water quality?	(1)
3.b	Illustrate the working of the Petroff-Hausser counting chamber.	(2)

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AY 2022-23
School of Computing
Curriculum: IIITUGCSE22
Cycle Test – II
19, July '23

Degree	B. Tech.	**Branch**	CSE
Semester	II		
Subject Code & Name	ENC204: Communication Skills		
Time: 60 Minutes	**Answer All Questions**		**Maximum Marks: 20**

S. No.	Question	Marks
1.a	Explain "Cohesion in Writing" with example. (Word limit: 50-80)	1
1.b	How does fossilization impact second language learning? (Word limit: 100-120)	2
1.c	Explain with at least with four examples the difference between regular and irregular verbs. Discuss how irregular verbs are overgeneralized by the non-native speakers of English. (Word limit: 100-120)	2
2.a	Listening is a psychological process whereas hearing is just physiological. Explain. (Word limit: 50-80)	1
2.b	What are the advantages and disadvantages of hierarchical structure in committees? (Word Limit: 100-120)	2
2.c	Explain each concept in at least 50 words: a. Brainstorming b. Drafting c. Proofreading	2

3.a	Apply the rules of Present Perfect Tense to the following sentences: 1.A dispute arose between two groups. 2. Carpenter bees are boring holes into the wall.	1
3.b	Rewrite the sentences with suitable idioms: 1. The pandemic caused many people to_____. a. Cut no ice b. Lose your marbles c. Cry Wolf d. Bear a grudge 2. Isn't it irritating that he _____by stealing the record before me. a. Wear your heart on your sleeve b. Cut no ice c. Read between the lines d. Rain on someone's parade	2
3.c	Write down one-word substitution for the following words: 1.The scientific study of elections 2.The branch of medical science which deals with the problems of the old 3.A person who is skilled in horsemanship 4.One who collects coins	2
4.a	How does interruption become a barrier to effective listening? Explain with example. (Word Limit: 50-80)	1
4.b	Describe the difference between slang, jargon and blends with appropriate examples. (Word limit: 100-120)	2
4.c.	Write down at least two synonyms for the following words: 1. Exculpate 2. Implore 3. Aspersion 4. Macabre	2

Good Luck

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AY 2022-23
School of Computing
Curriculum: IIITUGCSE22
Cycle Test - II
June 05, 2023

Degree	B.Tech
Branch	CSE
Semester	II
Subject code/name	MAC211/ Probability and Random Process
Time	60 minutes
Maximum Marks	20

Answer all the questions.

Q. No.	Questions	Marks
1(a)	State if the following statement is true or false: If the events A and B are independent, then so are $\overline{A}$ and $\overline{B}$. Give reasons for the answer.	1
1(b)	A random variable X has the following probability distribution: x_i: 0, 1, 2, 3, 4 p_i: 0, k, $2k$, $2k$, $3k$ Evaluate $P(1.5 < X < 4 \mid X > 2)$.	2
1(c)	In a certain assembly plant, three machines, M1, M2, and M3, make 30%, 45%, and 25% of the products respectively. Past experience shows that 2%, 3%, and 2% of the products made by the respective machines are defective. If the product was chosen randomly and found to be defective, what is the probability that it was made by machine M3?	2
2(a)	Define the covariance between the random variables X and Y.	1
2(b)	The joint density function of X and Y is given by $f_{XY}(x,y) = \begin{cases} \frac{x(1+3y^2)}{4}, & 0 < x < 2, 0 < y < 1 \\ 0, & \text{otherwise} \end{cases}$. Compute the conditional density of X given that $Y = y$, where $0 < y < 1$.	2
2(c)	A random variable X has the following probability distribution: x_i: -1, -2, 0, 1, 2 p_i: 0.1, k, 0.2, $2k$, 0.3 Evaluate $P(X \leq 1)$.	2

<table>
<tr><td>3(a)</td><td>A fair 6-sided die is rolled, and let X be the random variable representing the number rolled. Find the first moment of X using the moment generating function for X.</td><td>1</td></tr>
<tr><td>3(b)</td><td>Let the random variable X represent the number of defective parts for a machine when 3 parts are sampled from a production line and tested. The following is the probability distribution of X:
<table>
<tr><td>x</td><td>0</td><td>1</td><td>2</td><td>3</td></tr>
<tr><td>p</td><td>0.51</td><td>0.38</td><td>0.1</td><td>0.01</td></tr>
</table>
Calculate the variance for X.</td><td>2</td></tr>
<tr><td>3(c)</td><td>The joint pmf of X, Y is given by:
$$P_{XY}(x_i, y_j) = \begin{cases} k(x_i + y_j), & x_i = 1, 2, y_j = 1, 2 \\ 0, & \text{otherwise} \end{cases}.$$
Describe the marginal pmf's of X and Y.</td><td>2</td></tr>
<tr><td>4(a)</td><td>Consider the function $f(x) = \begin{cases} \frac{x^2}{3}, & -1 < x < 2 \\ 0, & \text{elsewhere} \end{cases}$. Could f be a probability density function? Give details.</td><td>1</td></tr>
<tr><td>4(b)</td><td>For the probability density function given in part 4(a) compute the cumulative distribution function (cdf) $F_X(x)$.</td><td>2</td></tr>
<tr><td>4(c)</td><td>The joint probability density function of the R.V. (X, Y) is given by
$$f(x, y) = 4xye^{-(x^2+y^2)}, \; x > 0, \; y > 0.$$
Prove that X and Y are independent.</td><td>2</td></tr>
</table>

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

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School of Computing
CURRICULUM: IIITUGCSE22
Cycle Test - II
July 18, 2023: 9:00 AM-10:00 AM

Degree	B. Tech.	**Branch**	CSE
Semester	II		
Subject Code & Name	CSC203: Basics of Programming in C		
Time: 60 Minutes	**Answer All Questions**		**Maximum: 20 Marks**

Sl. No.	Question	Marks
1.a	How does call by value differ from call by reference?	1
1.b	To convert a decimal number into its equivalent binary number the following statements are required: i. To get the remainder r, the statement r=q%_ ii. To get the quotient q, the statement, q=q/_ iii. To get the binary bi, statement, bi=bi*10+r Fill in the above blanks and also explain with an example.	2

1.c	What will be the outputs of the following code? Justify with proper explanation.
	int main(){
	char *st[ ]={"ACE", "MANGO", "IIIT", "HIGHLY"};
	char **str[ ]={st+3,st+2,st+1,st};
	char ***c=str;
	printf("%s", **++);
	printf("%s", *--*++c+1);
	}
		2

2.a	What is the pre-requisite of binary search? Discuss the basic concept behind binary search.	1
2.b	Explain the string handling function in C with suitable examples.	2
2.c	Write a C program to sort a set of n numbers in ascending order and explain the algorithm used.	2
3.a	I. Give the declaration for the string "COMPUTER" in C. II. What is the value of s[5] in the following segment? char s[15]= "MICROPROCESSOR"	1

3.b	Discus the output of the following codes:
	I. int main() {
	int i = 3;
	switch (i % 2) {
	case EVEN:
	printf("Even");
	break;
	case ODD:
	printf("Odd");
	break;
	default:
	printf("Default");
	}
	return 0;
	}
	
	II. int main()
	{
	int n;
	for (n = 9; n!=0; n--)
	printf("n = %d", n++);
	return 0;
	}
		2

3.c	Write a C program using pointer to swap two numbers without taking the third variable.	2
4.a	Differentiate between built-in-functions and user defined functions.	1

4.b	Explain the output of the following code:
	#include <stdio.h>
	int main() {
	
	int a=2, *b=&a, **c=&b;
	
	printf("%d %d %d %d",a,b,c,*b,**c);
	
	return 0;
	}
		2

4.c	Write a C program to print the following pattern: 1 2 3 4 5 1 2 3 4 1 2 3 1 2 1	2

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AY 2022-23

School of Basic Sciences

CURRICULUM: IIITUGCSE22

Cycle Test – II

17, July' 2023

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Degree	B. Tech.	**Branch**	Computer Science and Engineering
Semester	Second		
Subject Code & Name	PHC202: Engineering Physics		
Time: 60 Minutes	**Answer All Questions**		**Maximum: 20 Marks**

Q.1a- What is the orthonormalization condition for a wave function ? **1**

Q.1b- Make use of the Uncertainty principle, and show that the uncertainty relation for the time and the energy is given by the following relation: $\Delta t\ \Delta E \geq \hbar/2$. **2**

Q.1c- An electron is trapped in a one dimensional potential ($= kx^2/2$). At a time $t = 0$ the state of the electron is described by the wave function $\psi = c_1\psi_1 + c_2\psi_2$, where ψ is the eigen function belonging to the eigen value $E_n=(n+1/2)\omega$. Find the expected value of the energy. **2**

Q.2a- What are the properties of the Hilbert space ? **1**

Q.2b- Make use of the Commutator, and show that the following is true:

$$[\hat{A}, \hat{B}\hat{C}\hat{D}] = \hat{A}\hat{B}\hat{C}\hat{D} + \hat{B}\hat{A}\hat{C}\hat{D} - \hat{B}\hat{C}\hat{A}\hat{D} - \hat{B}\hat{C}\hat{D}\hat{A}.$$ **2**

Q.2c- Make use of the potential step (when $E > V_0$), and establish the relation between k_1 and k_2 so that the reflection coefficient becomes the same as transmission coefficient. **2**

Q.3a- What is meant by the degeneracy of a quantum state ? **1**

Q.3b- Make use of the Maxwell's law of speed distribution, and show that the expected value of the speed distribution of gas molecules (molecular weight M) is given by: **2**

$$\langle v \rangle = \sqrt{\frac{8RT}{\pi M}}.$$

Q.3c- Make use of the special theory of relativity, and show that the product of group and phase velocities of a wave packet is nothing but square of the speed of light. **2**

Q.4a- Show that the energy spectrum of a particle, which is confined in the infinite deep potential is discrete in nature. **1**

Q.4b- Make use of the Fermi-Dirac distribution, and show that at absolute zero temperature all energy states up to the Fermi level are occupied, and none above the Fermi level. **2**

Q.4c- Make use of the Kronig-Penney equation, and explain the conducting, semiconducting, and insulating behavior of materials. **2**

**** GOOD LUCK ****