



डॉ. श्यामप्रसाद मुखर्जी अंतरराष्ट्रीय सूचना प्रौद्योगिकी संस्थान

**DR. SHYAMA PRASAD MUKHERJEE INTERNATIONAL  
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**END TERM EXAMINATION (Autumn, 2022-23)**

**Branch & Year:** B.Tech ECE/CSE/DSAI **Autumn 2022-23**

**Semester:** I

**Subject:** Study of Human Values **Subject Code:** HS103C **Instructor Code:** RM

**Total Marks:** 50

**Duration:** 180 Minutes

**Date:** March 03, 2023

(Answer All Questions)

**Part I**

1. Does this course bring any changes, or clarity in your goal, behavior, and conduct? If yes, write down the changes; if not, why? [3]
2. Match the column [4]

(a) Trust	2	(1) feeling of acceptance for excellence
(b) Glory	4	(2) responsibility & commitment to ensuring the Right Understanding and Right Feeling in the self of my relative
(c) Affection	6	(3) Feeling for those who have made effort for excellence
(d) Care	8	(4) Recognition, Fulfilment & Evaluation of Human-Human Relationship, leading to Mutual Happiness
(e) Love	5	(5) to have the clarity that the other wants to make me happy & prosperous
(f) Justice	8	(6) Feeling for those who have made effort for my excellence
(g) Reverence	2	(7) feeling of being related to the other
(h) Respect	3	(8) responsibility & commitment for nurturing and protection of the Body of my relative
(i) Guidance		(9) right evaluation of feeling
(j) Gratitude	1	(10)The feeling of being related to all

**Part II**

**Word limit: Maximum 50 words.**

3. Isn't affection the same as the attachment to one or a few people? What is the difference between affection and love? [3]
4. Can we not achieve excellence through competition? After all, good colleges and good jobs are so limited, so there has to be competition. [3]
5. Love, falling in love, and having boy/girlfriends is a major issue for students. It often distracts them from their studies. How can that be resolved? [3]
6. What is the difference between ragging and interaction? [3]

7. How do I ensure the right evaluation? How do I know that my evaluation is right? [3]
8. Please elaborate on Self as the seer, doer, and enjoyer. [3]
9. You started observing the feeling in your imagination. Find out whether the feeling you have in your imagination is naturally acceptable to you or not, and note down your observation after observing for some time. [3]
10. You have the right intention and want to help the other improve his competence, but he does not listen. What should you do? How many times, for how long should you help the other to improve their competence? [3]
11. To motivate me, my mother used to say, "you are different, you are special – you can do anything." My father never appreciated me. Even when I did well at school, he would just say, "Good. Do better next time". Now that teachers are telling students that "you can do anything," "sky is the limit". And for the poor students, "if you don't improve, you can't get the opportunity to do good work". Both are to motivate them to do better. Now we can see that these are like an over-evaluation or even otherwise evaluation! So, what would be the right way of appreciating and motivating my students to do good work? [3]
12. Define the character of a human? Why it is necessary to build the character? Write a few steps to build the character. [3]
13. In nature, the first three orders already have definite conduct. Why does the human order have to work for definite conduct? Why is that also not automatic or natural? [3]

### **Part III**

#### **Word limit: Maximum 100 words.**

14. Justify with an appropriate example, that right understanding is the first priority, the relationship is the second, and physical facility is the third priority. Explain the transformational development from animal consciousness to human consciousness. [5]
15. How can we differentiate between desire and thought and expectation? It all seems to be one thing. What is the impact of preconditioning on them? [5]



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### END TERM EXAMINATION, Autumn 2022

Branch : CSE, DSAI & ECE      Year : I      Semester : I  
Subject : Probability & Statistics      Subject Code : MA105C      Instructor Code : Rk  
Time : 150 min      Date : 25.02.2023      Maximum Marks : 50

- 
- i) Answer all the questions.
  - ii) Answer all the questions of a part in one place.
- 

#### PART A - 15 Marks

1. Can two mutually exclusive events be independent? Explain? [2]
2. What is the Central limit theorem? [2]
3. Is  $f_{X,Y}(x,y) = \frac{3}{2}x^2(1-|y|)$  a valid pdf on  $A = \{(x,y) : -1 \leq x \leq 1 \text{ and } -1 \leq y \leq 1\}$ . [2]
4. Define any two of each central tendency and central dispersion of discrete frequency distribution. [4]
5. Prove or disprove that if  $X$  and  $Y$  are two independent random variables, then  $\text{COV}(X, Y) = 0$ . [2]
6. Derive the relation between Root mean square deviation and standard deviation. [3]

#### PART B - 35 Marks

7. The following table shows the diameters in inches of a sample of bearings manufactured by a company. Arrange the data in appropriate class intervals, and find the mean and median. [2+2+2]

0.738	0.728	0.745	0.733	0.735	0.732
0.729	0.737	0.736	0.730	0.732	0.737
0.743	0.736	0.742	0.732	0.735	0.731
0.740	0.735	0.740	0.730	0.727	0.746
0.736	0.724	0.728	0.739	0.734	0.735
0.741	0.733	0.738	0.734	0.732	0.735
0.735	0.742	0.725	0.738	0.736	0.729
0.731	0.736	0.733	0.739	0.741	0.734
0.726	0.739	0.734	0.727	0.736	0.730
0.737	0.735	0.732	0.735	0.744	0.740

9  
60

4

16

8. Define independence of two random variable defined on a Sample space. The following table gives joint probability  $p(x, y)$  of two random variables  $X$  and  $Y$ . Check whether the events (i)  $X = 3$  and  $Y = 2$ , (ii)  $X = 1$  and  $Y = 2$ , (iii)  $X = 2$  and  $Y = 1$ , independent or not? [5]

$\backslash Y$	1	2	3	4
1	$\frac{1}{8}$	$\frac{1}{16}$	$\frac{1}{32}$	$\frac{1}{32}$
2	$\frac{1}{16}$	$\frac{1}{8}$	$\frac{1}{32}$	$\frac{1}{32}$
3	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$
4	$\frac{1}{4}$	0	0	0

9. A random variable  $X$  has pdf  $f_X(x) = \begin{cases} cx(1-x^2), & 0 \leq x \leq 1, \\ 0 & \text{otherwise.} \end{cases}$  Find the first three moments about origin. Also find the mean and variance. [6]

10. Assume that 64 students (3rd year) will appear for internship interviews at various companies. No student can appear for multiple companies and must attend an interview. Let 32, 16, 8, 4 and 4 be the numbers of the students appearing for MSR, Intel, Google, Honeywell and Infosys interviews, respectively. Let 20, 18, 24, 16, and 14 are the annual package offered (in Lakhs) by the companies, respectively. Let  $X$  be a random variable representing the annual package of a company in which a randomly selected student will take his/her interview. Find the expected annual package of a randomly selected student and the variance of packages. [5]

11. Each of three identical jewellery boxes has two drawers. In each drawer of the first box there is a gold watch. In each drawer of the second box there is a silver watch. In one drawer of the third box, there is a gold watch, while in the other, there is a silver watch. If we select a box at random, open one of the drawers and find it to contain a silver watch, what is the probability that the other drawer has the gold watch ? Solve it using conditional probability (Bayes Theorem) by defining some events. [5]

12. In the P&S examination taken by 182 students, the mean and standard deviation of marks found to be 45% and 10%, respectively. If the marks saved are normally distributed, find how many will pass if the minimum pass marks are 33%. Also find the number of students who can get  $A^+$  if the range for  $A^+$  is 93% to 100%. [4+4]

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

Y  
6



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**End-Term Examination Spring, 2023**

**Branch & Academic Year: ECE/CS/DSAI (2022)**

**Semester: I**

**Subject: International Language Competence-Adv. Subject Code: HS105C Instructor Code: SYNG**

**Max Marks: 50**

**Duration: 2 ½ hr**

**Date: 2.03.2023**

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Q1. Define communication and mention some of its features with appropriate examples. (5M)

Q2. Explain the process of communication with a neat diagram. (5M)

Q3. Why English is considered a Global Language? (2.5M)

Q4. Why humans are capable of using Language? (2.5M)

Q5. A. Why Body Language is considered as a critical element in oral communication? (3M)

B. Explain all the essential elements of body language. (3M)

Q6. Explain:

- a. Intrapersonal Barriers to communication (5M)
- b. Organisational Barriers to Communication (5M)

Q7. Discuss what these following phrases mean to you when you read *The Road Not Taken*: (4M)

- a. a yellow wood
- b. it was grassy and wanted were
- c. leaves no step had trodden back
- d. how way leads on to way

Q8. Explain the humour in the ending of the story The Gold Frame. (2.5M)

Q9. Do you agree with G.B. Shaw's advice to foreigners that they should speak broken English? (2.5M)

Q10. Deduce Harrison's character from the novel *Longitude*. Justify your assessment with appropriate examples: (3M)

Q11. What are the different sources of technical writing? Mention the five salient features of technical writing. (5M)

Q12. Solve the following Anagrams: (2M)

- a. Hectares
- b. Sunlight
- c. Treason
- d. Recital

End Term Examination, February - 2023

Branch : ECE, CSE &amp; DSAI

Semester : I

Academic Year : 2022-23

Subject : Linear Algebra &amp; Matrix Analysis

Subject Code : MA102C

Instructor Code : MKC

Maximum Marks : 50

Duration : 180 Minutes

Date : 01-03-2023

**Instructions:**

- Answer all the questions.
- Figures in the right hand margin indicate full marks for the question.

**Questions:**

1. By using LU factorization method, solve the linear system  $\begin{cases} x + 4y - 3z = 0 \\ -x - 3y + 5z = -3 \\ 2x + 8y - 5z = 1. \end{cases}$  [5]
2. Find the inverse of the matrix  $A = \begin{bmatrix} 4 & 1 & -1 \\ 2 & 5 & -2 \\ 1 & 1 & 2 \end{bmatrix}$  using Gauss-Jordan method. [5]
3. Find conditions on  $a, b, c$  so that  $v = (a, b, c)$  in  $\mathbb{R}^3$  belongs to  $W = \text{span}(u_1, u_2, u_3)$ , where  $u_1 = (1, 2, 0), u_2 = (-1, 1, 2), u_3 = (3, 0, -4)$ . [5]
4. Find a basis for the vector space  $V = \mathbb{R}^3$  that contains the vectors  $\left\{ \begin{bmatrix} 2 \\ -1 \\ 3 \end{bmatrix}, \begin{bmatrix} 1 \\ 0 \\ 2 \end{bmatrix} \right\}$ . [5]
5. Let  $B_1 = \left\{ \begin{pmatrix} 1 \\ 2 \\ 1 \end{pmatrix}, \begin{pmatrix} 0 \\ 1 \\ 1 \end{pmatrix}, \begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix} \right\}$ ,  $B_2 = \left\{ \begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix}, \begin{pmatrix} -1 \\ 1 \\ -1 \end{pmatrix}, \begin{pmatrix} 2 \\ 1 \\ -1 \end{pmatrix} \right\}$ , and  $[v]_{B_1} = \begin{pmatrix} -1 \\ 0 \\ 2 \end{pmatrix}$ .  
 (i) Find the transition matrix  $[I]_{B_1}^{B_2}$ . (ii) Find  $[v]_{B_2}$ . [3+2]
6. Let  $T : \mathbb{R}^3 \rightarrow \mathbb{R}^3$  be a linear operator and  $B = \{\mathbf{v}_1, \mathbf{v}_2, \mathbf{v}_3\}$  a basis for  $\mathbb{R}^3$ . Suppose  

$$T(\mathbf{v}_1) = \begin{bmatrix} -2 \\ 1 \\ 1 \end{bmatrix}, \quad T(\mathbf{v}_2) = \begin{bmatrix} 0 \\ 1 \\ -1 \end{bmatrix}, \quad T(\mathbf{v}_3) = \begin{bmatrix} -2 \\ 2 \\ 0 \end{bmatrix}$$
  
 (i) Find a basis for  $R(T)$ , (ii) Find the dimension of  $N(T)$ . [3+2]
7. Let  $T : \mathbb{R}^2 \rightarrow \mathbb{R}^2$  be the linear operator defined by  $T \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} x+2y \\ x-y \end{pmatrix}$ . Let  $B$  be the standard ordered basis for  $\mathbb{R}^2$  and  $B'$  the ordered basis for  $\mathbb{R}^2$  defined by  $B' = \left\{ \begin{bmatrix} 1 \\ 2 \end{bmatrix}, \begin{bmatrix} 4 \\ -1 \end{bmatrix} \right\}$ . Find the matrix  $[T]_{B'}^B$ . [5]
8. Diagonalize the matrix  $B = \begin{bmatrix} 1 & -3 & 3 \\ 3 & -5 & 3 \\ 6 & -6 & 4 \end{bmatrix}$ . [5]
9. Let  $\langle p, q \rangle = \int_0^1 p(x)q(x)dx$  is an inner product defined on  $\mathcal{P}_3$  where  $p(x) = 2x^2 + 1$  and  $q(x) = x^2 - 1$ .  
 (i) Find  $\text{proj}_q p$ .  
 (ii) Find  $p - \text{proj}_q p$  and verify that this vector  $p - \text{proj}_q p$  is orthogonal to  $q$ . [2+3]
10. Let  $B$  be the basis for  $\mathbb{R}^3$  given by.  $B = \{\mathbf{v}_1, \mathbf{v}_2, \mathbf{v}_3\} = \left\{ \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}, \begin{bmatrix} -1 \\ 1 \\ 0 \end{bmatrix}, \begin{bmatrix} -1 \\ 0 \\ 1 \end{bmatrix} \right\}$ . Apply the Gram-Schmidt process to  $B$  to find an orthonormal basis for  $\mathbb{R}^3$ . [5]



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**END SEMESTER EXAMINATION (Feb, 2023)**

**Branch & Year:** ECE, CSE, DSAI 2022

**Semester:** 1<sup>st</sup>

**Subject:** Sensors & Actuators

**Instructor Code:** AB, BCM, DD

**Max Marks:** 50

**Duration:** 2.30 hr

**Date:** 28/02/2023

**Instruction:** Attempt any **5 questions**. Answer all the parts of a question in same place. Answer to the point. Scientific calculator may be used for calculation. Avoid answering with pencil.

1. (a) What is the difference between sensor and transducer? Give appropriate examples. [2]  
(b) Explain the “loading effect” and how does it affect the accuracy of measurement? [2]  
(c) Justify the statement “the sensitivity of semiconductor strain gauge is very high compared to metal type”. [2]  
(d) Derive the formula for gauge factor. [2]  
(e) A strain gauge is made of constantan with conductivity is  $2 \times 10^6$  S/m. Under no strain the total length of the sensor is of 25 cm with a cross sectional area of  $1 \times 10^{-9}$  m<sup>2</sup>. When a force is applied longitudinally causing a strain of 0.001, the new cross sectional area is  $9.99 \times 10^{-10}$  m<sup>2</sup>. Calculate the change of resistance of the sensor under the applied force. Estimate the gauge factor. [2]
  
2. (a) What is cold-junction compensation for thermocouple? [2]  
(b) Explain the law of intermediate temperature of T/C using schematic diagram. [2]  
(c) What is the piezoelectric transducer? Draw its equivalent circuit diagram? [2+1]  
(d) A quartz crystal has the dimensions of 2mm × 2mm × 1 mm. Quartz has the following properties:  
Charge sensitivity = $2\text{pC/N}$   
Young's modulus = $9 \times 10^{10}\text{N/m}^2$   
Permittivity = $40.6 \times 10^{-12}\text{F/m}$   
If the crystal is subjected to a dynamic strain of  $10 \times 10^6\text{m/m}$ , then what is the output voltage generated by the crystal? [3]
  
3. (a) Describe the working principle of capacitive comb type accelerometer with proper schematic. What is the advantage of having multiple numbers of fixed and movable fingers on it? [3]  
(b) Describe the principles of Amperimetric Electrochemical-type CO gas sensor. [2]  
(c) Explain with proper schematic diagram the working principle of cantilever type explosive detector. [3]  
(d) What is the working mechanism of blood glucose sensor? [2]
  
4. (a) How does Bell's microphone work? What was the disadvantage of Bell's microphone?  
How did Edison resolve that? [2+1+2]  
(b) Explain the working mechanism of dynamic microphone with a suitable schematic diagram. [2]  
(c) A sinusoidal current of amplitude 1 A at a frequency of 1 kHz was supposed to be converted in acoustic signal using a speaker. Assume the loudspeaker is working under Lorentz force and has a coil of 60 mm in diameter, 40 copper coil turns, and a permanent magnet producing a magnetic flux density of 0.9 T. The coil and the diaphragm have a total mass of 25 gm. What will be the acceleration of the diaphragm movement? [3]

5. (a) Explain how ultrasonic sensor can be used to detect crack in solid wall. [3]  
(b) Explain the working principle of photoresistor (LDR). What is dark current? [3+1]  
(c) A 100 W light source emits uniformly in all directions. A photodetector having a circular active area whose diameter is 2 cm is placed 1m away from the source, normal to the incident light. If the responsivity of the photodetector is 0.4 A/W, the photo-current generated in the detector, in units of mA is? [3]
6. (a) Explain photoelectric effect. What are the major limitations? [3]  
(b) How can endoscopy- ultrasound be performed? [2]  
(c) Differentiate between accuracy and precision of a sensor. [1.5]  
(d) Is thermistor linear or non-linear? How can we improve the linearity? [1.5]  
(e) A thermistor has a resistance of  $1 \text{ k}\Omega$  at temperature of 298K and  $465 \Omega$  at temperature of 316K. The temperature sensitivity in  $\text{K}^{-1}$ , of the thermistor at 316K is [2]

-----Best of Luck-----



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END TERM EXAMINATION, FEBRUARY-2023

Branch: CSE              Year: I              Semester: I              Max Marks: 50  
Subject: ICP              Sub. Code: CS105C              Time: 180 min              Instructor Code: SV/VJ/KJ

1. ANSWER ALL THE QUESTIONS IN THE ORDER IN WHICH THEY ARE GIVEN, OTHERWISE WILL NOT BE EVALUATED. FIRST TEN QUESTIONS CARRIES 4 MARKS EACH AND REST 5 MARKS EACH

1. What is an operator? Write only name of the types of operators that are included in the 'c' language with the example for each?
2. Write a program to check whether the given string is a palindrome or not without using the built-in functions.
3. Difference between break and continue statement with examples?
4. Explain briefly about string classifications?
5. What is a storage class. Explain the different storage classes in c?
6. What is constant? Explain different types of constants in short with example of valid and invalid constant.
7. Explain arithmetic and bitwise operator with example.
8. Define structure? Write rule for declaring structure and accessing the structure variables with a program.
9. Explain about file handling function. Write a program to read the data from the file and display on the screen.
10. How the functions are categorized based on the value returned by the function and parameters accepted. What are the different ways of passing the parameters to the functions, demonstrate through the program.
11. What is a pointer variable? How to initialize pointer variable? How to access the value a variable using pointers.
12. Write a program to demonstrate the memory allocation functions and explain it.

Quote: THERE IS NO ALGORITHM FOR HUMOR, *Robert Mankoff*



TERM EXAMINATION

**Branch & Academic Year:** DSAI/ECE/CSE (2022-2023)  
**Subject:** Introduction to Computer Programming  
**Duration:** 30 Minutes

**Semester:** I  
**Max Marks:** 20  
**Date:** 10/02/2023

**Note:** Answer the questions in the order in which they are given. Otherwise will not be considered for the evaluation.

1. Write one major difference between call by value and call by reference.
2. What is the output.

```
#include <stdio.h>
void main()
{ printf("%d", main); }
```

3. Predict the output?

```
#include <stdio.h>
int main()
{ void demo(); void (*fun)(); fun = demo; (*fun)(); fun(); return
0;}
void demo()
{ printf("hello_world"); }
```

4. Is this statement is wrong? myname = "robin"; if no then write the right method.
5. The % symbol has a special use in a printf statement. How would you place this character as part of the output on the screen? Example we should get 10%, where a=10.
6. Can we change the size of an array at run time?
7. Let a[4]={10, 20} then write the values of a[0], a[1], a[2] and a[3] in the order.
8. What the output.

```
#include <stdio.h>
int main()
{ char c[] = "HELLOWORLD";
char *p=c;
printf("%c,%c", *p,*(p+p[3]-p[1]));}
```

9. How many pointers can point to the same address?
10. What is an array of pointers?
11. Is the following statement a declaration or definition  
**extern int i;**



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12. which of the following statement are correct?

- i. The value stored in the CPU register can always be accessed faster than that stored in memory.
- ii. A register storage class variable will always be stored in a CPU register.

13. What will be the output of the following program?

```
#include <stdio.h>
static int y = 1;
int main()
{ static int z;
printf("%d %d", y, z); return 0; }
```

14. What is the initial value of register storage class specifier?

15. Which function is used to delete the allocated memory space?

16. Can we increase the size of dynamically allocated array?

17. Which is the correct sequence of compilation process?

18. Can we declare function inside the structure of c programming?

19. Is it necessary that all elements of structure should be different in size?

20. The data structure used to implement recursive function calls is called?



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**End Term Examination, Autumn 2022-23**

**Branch & Academic Year:** CSE/ECE/DSAII    **Autumn 2022-23**    **Semester:** I Semester  
**Subject:** Discrete Mathematics                                  **Instructor Code:** KGS  
**Max Marks:** 75    **Duration:** 180 Minutes    **Subject Code:** CS212C

**Part A (You need to write the answer in the first page of the answer book in a proper tabular form. In the first page of your answer book, first write a table in the following format and then fill the answers for the questions for Part A in that table itself.)**

Q. No. (1 Mark Questions)	Answer	Q. No. (2 Mark Questions)	Answer
1	19		
2	20		
:	:		
.	.		
18	29		

1. For the arithmetic sequence  $a_n = a + (n-1)d$ , if  $a_3 = 11$  and  $a_5 = 19$ , then the value of  $a$  is (1M)  
a. 8    b. 4    c. 7    d. 3
2. In how many ways can we distribute 12 chocolates into 3 distinct boxes: (1M)  
a.  $\binom{12}{3}$     b.  $\binom{14}{2}$     c.  $\binom{14}{3}$     d.  $\binom{11}{2}$
3. Let  $A$ ,  $B$  be two sets and  $U$  be the universal set, the  $A \cap (A \cup B)^c$  is (1M)  
a.  $A$     b.  $U$     c.  $\emptyset$      d.  $A - B$
4. State the following statement is true or false:  $(A \cup B) - (A \cap B) = (A - B) \cup (B - A)$  (1M)  
a. True    b. False
5. Consider the following sentences.  $p$ : 8 is a prime number;  $q$ : How is the weather today? (1M)  
a. Both  $p$  and  $q$  are statements                                      b.  $p$  is a statement,  $q$  is not a statement  
c.  $p$  is not a statement,  $q$  is a statement                              d. Both  $p$  and  $q$  are not statements
6. For how many assignments of  $p$ ,  $q$  and  $r$ , is the  $q \wedge (\neg r \rightarrow p)$  true? (1M)  
a. 3    b. 6    c. 2    d. 4
7. Let  $R$  be a relation on natural numbers defined on  $R = \{(n, n^2) | n \in \mathbb{N}\}$ . Then  $R$  is (1M)  
a. Reflexive    b. Transitive    c. Equivalence relation    d. Anti-symmetric
8. Which of the following is NOT a relation from  $M = \{a, b, c\}$  to  $N = \{1, 10, 100\}$  (1M)  
a.  $\{(a, 1), (a, 10), (a, 100)\}$                                       b.  $\{(a, 10), (1, b), (c, 100)\}$     c.  $\{(c, 10), (b, 100)\}$
9. Let  $X = \{1, 2, 3\}$ . If  $f: X \rightarrow X$  be defined as  $f(1) = 3$ ,  $f(2) = 1$ , and  $f(3) = 2$ , the  $f(f(1))$  is (1M)  
a. 1    b. 2    c. 3    d. Not defined
10. Let  $f: \mathbb{N} \rightarrow \mathbb{N}$  such that  $f(n) = n + 15$ . The  $f$  is (1M)  
a. Bijective    b. One-one    c. Onto    d.  $f$  is not a function
11. If  $f: A \rightarrow B$  is an onto function, then (1M)  
a.  $|A| = |B|$     b.  $|A| \geq |B|$     c.  $|A| \leq |B|$     d. Cannot say
12. Let  $P(n)$  be a statement, where  $n \in \mathbb{N}$ , natural numbers.  $P(1)$  is true and  $P(k) \Rightarrow P(k+1)$ , for some natural number  $k$ . (1M)  
a. True    b. False
13. If  $f: X \rightarrow Y$  be a function such that  $|X| > |Y|$ , then by Pigeonhole Principle, we can conclude that (1M)  
a.  $f$  is one-one    b.  $f$  is onto    c.  $f$  is not one-one    d.  $f$  is not onto
14. The closed form of the generating function obtained by the sequence 1, 3, 9, 27, ... is : (1M)  
a.  $\frac{1}{1+3x}$     b.  $\frac{1}{(1+x)^3}$     c.  $\frac{1}{1-3x}$     d.  $\frac{1}{(1-x)^3}$
15. Let  $|A| = 40$ ,  $|B| = 40$ ,  $|C| = 40$ ,  $|A \cap B| = 10$ ,  $|A \cap C| = 10$ ,  $|B \cap C| = 10$ ,  $|A \cap B \cap C| = 10$ . Then,  $|A \cup B \cup C|$  is (1M)  
a. 100    b. 140    c. 150    d. 90
16. Let  $G = \{0, 1, 2, 3, 4, 5\}$  be a group under addition modulo 6. Then inverse of 5 is (1M)  
a. 4    b. 1    c. 2    d. None of the options from a, b, c
17. Which of the following is a group? (1M)  
a. Natural numbers under addition                                    b. Integers under subtraction  
b. Real numbers under multiplication                                    d. None of the above
18.  $G = \{1, 2, 3, 4, 5, 6\}$  is a group under multiplication modulo 7. Which of the below is a subgroup of  $G$ ? (1M)  
a.  $\{1, 3, 4\}$     b.  $\{2, 5\}$     c.  $\{1, 6\}$     d. None of the options from a, b, c

19. Let A and B be two sets such that  $A - B = \{1,3,5,7,11\}$ ,  $B - A = \{2,6,8\}$  and  $A \cap B = \{4,10\}$ , then the set A is equal to (2M)  
 a. {2,4,6,8,10}      b. {1,3,4,5,7,10,11}      c. {1,2,3,4,5,6,7,8,10,11}      d. Can't find A
20. Each student in a class of 100 plays at least one sport Football, Cricket or Tennis. 40 play Football and 30 play Tennis. 15 play Football and Cricket, 10 play Cricket and Tennis and 8 play Football and Tennis. 3 Students play all 3 sports. Find the number of students who play cricket? (2M)  
 a. 60      b. 40      c. 50      d. 45
21. Consider the following two statements.  $p$ : A number is divisible by 5;  $q$ : A number is divisible by 15. Which of the following is true? (2M)  
 a.  $p \rightarrow q$       b.  $q \rightarrow p$       c.  $p \leftrightarrow q$       d.  $q \rightarrow \neg p$
22. If  $f: \mathbb{Z} \rightarrow \mathbb{Z}$  is defined as  $f(n) = 11n$  and  $g: \mathbb{Z} \rightarrow \mathbb{Z}$  is defined as  $g(n) = (n) \bmod 7$ , the  $(g \circ f)(4)$  is (2M)  
 a. 4      b. 7      c. 44      d. 2
23. A box contains 8 socks of white color and 8 socks of black color, all un-matched. A man takes socks out at a random in dark. How many minimum socks must be take out to be sure that he has at least 2 socks of the same color? (2M)  
 a. 9      b. 5      c. 15      d. 3
24. Generating function for  $a + b + c + d = 5$ , where  $0 \leq a, b, c, d \leq 5$  is (2M)  
 a.  $(1+x+x^2+x^3+x^4+x^5)^3$       b.  $(1+x+x^2+x^3+x^4+x^5)^5$   
 c.  $(1+x+x^2+x^3+x^4+x^5)^4$       d.  $(x+x^2+x^3+x^4+x^5)^4$
25. The derivative of  $\frac{1}{1-x}$  is a generating function whose sequence is (2M)  
 a. 1,2,3,4,5,...      b. 0,1,0,1,0,...      c. 1,2,4,8,16,...      d. 1,2,4,6,8,...
26. Which of the following represents the number of ways of distributing 40 identical chocolates among 8 children? (2M)  
 a. The coefficient of  $x^{40}$  in  $(1+x+x^2+x^3+\dots+x^{40})^2$   
 b. The coefficient of  $x^{40}$  in  $(1+x+x^2+x^3+\dots+x^{40})^4$   
 c. The coefficient of  $x^{40}$  in  $(1+x+x^2+x^3+\dots+x^{40})^8$   
 d. None of the above
27. In how many ways can 10 distinct chocolates be distributed among 4 students with exactly two students getting nothing? (2M)  
 a. 6132      b. 6122      c. 6131      d. None of the options from a, b, c
28. A sequence is generated by the recurrence relation  $a_{n+1} = k_a + 8$ , where  $k$  is a constant. Given  $a_1 = 36$ , and  $a_2 = 20$ , find the value of  $k$  (2M)  
 a.  $\frac{1}{2}$       b. 1/3      c.  $\frac{1}{4}$       d. None of the options from a, b, c
29. John received 15 rate stamps as a gift from his grandfather, so he decided to start a stamp collection. From the following week onward, John added 3 new stamps to his collection each week. Recurrence relation for the number of stamps in the nth week is (2M)  
 a.  $A_n = A_{n-1} - 3$       b.  $A_n = A_{n-1} + 3A_{n-2}$       c.  $A_n = A_{n-1} + 3$       d.  $A_n = A_{n-1} - 3A_{n-2}$

**Part B**

1	Solve the following using laws of logic (i) $(p \vee q) \wedge \sim(\sim p \wedge q)$ . (ii) $\sim[\sim(p \vee q) \wedge r] \vee \sim q$	(6)
2	i. Illustrate that the hypotheses "Randy works hard," "If Randy works hard, then he is a dull boy," and "If Randy is a dull boy, then he will not get the job" imply the conclusion "Randy will not get the job." ii. Give a proof by contradiction of the theorem "If $3n + 2$ is odd, then $n$ is odd."	(6)
3	Illustrate that the premises "If you send me an e-mail message, then I will finish writing the program," "If you do not send me an e-mail message, then I will go to sleep early," and "If I go to sleep early, then I will wake up feeling refreshed" lead to the conclusion "If I do not finish writing the program, then I will wake up feeling refreshed."	(6)
4	Let $A = \{1,2,3,4,5,6,7\}$ and $R$ be relation on $A$ defined by $aRb$ if and only if $a-b$ is a multiple of 3. i. Indicate that $R$ is an equivalence relation on $A$ . ii. Identify the equivalence classes and partition of $A$ induced on $R$ .	(6)
5	i. A total of 1232 students have taken a course in Spanish, 879 have taken a course in French, and 114 have taken a course in Russian. Further, 103 have taken courses in both Spanish and French, 23 have taken courses in both Spanish and Russian, and 14 have taken courses in both French and Russian. If 2092 students have taken at least one of Spanish, French, and Russian, how many students have taken a course in all three languages? ii. What is the minimum number of students required in a discrete mathematics class to be sure that at least six will receive the same grade, if there are five possible grades, A, B, C, D, and F?	(6)
6	Use the definition of addition and multiplication in $Z_m$ to find $7 +_{11} 9$ and $7 \cdot_{11} 9$ .	(5)



**Dr. Shyama Prasad Mukherjee**  
**International Institute of Information Technology, Naya Raipur**  
**END TERM EXAMINATION AUTUMN, 2023**

**Branch & Year:** CSE/DSAI/ECE (2022-23)  
**Subject:** Software Development  
**Max Marks:** 50

**Semester:** 1<sup>st</sup>  
**Subject Code:** CS/EC/DA 101

**Date:** 03/03/2023  
**Instructor Code:** AB/KJ  
**Duration:** 150 Minutes

**NOTE:**

1. You have to attempt only 10 questions; all parts of a question should be answered together.
2. Try to explain your logic/modules used in the form of comments as much as possible.
3. Students are allowed to carry books, notes (hard copy), etc.
4. All electronic gadgets except calculators are strictly prohibited.

**Q1. (a)** Write a code that reads from a file “sales.dat” which has following information [itemcode, amount].  
Read from the file and find the sum of the amount for any number of entries. [2]

**(b)** Print the following diamond pattern [3]

```
    . . . A
    . . ° A B C
    . ° A B C D E
    ° A B C D E F G
    A B C D E F G H I
    A B C D E F G
    A B C D E
    A B C
    A
```

**Q2. (a)** Write a program for lexicographic replacement of consonants or numbers. For example, if input string is “IIITNayaRaipur2022”, then output string will be “IIIUOAZASAIQUS3133” [2]  
**(b)** State the criteria to check whether a palindrome string is possible from a given string or not by rearranging the characters. [1]  
**(c)** Explain bubble sort in descending order with an example (5 numbers) clearly illustrating all the passes. [2]

**Q3. (a)** Write a program to create a dictionary where the keys are taken from the first dictionary and the values from the second dictionary. [2]  
**(b)** Check if one dictionary is subset of the other, and if it is a subset create a Data Frame from it. [3]

**Q4. (a)** Convert tuple records to single string. For example, if input tuple list is [(‘James’, ‘John’), (‘Henry’, ‘Howard’), (‘Gilbert’, ‘Danny’)], then output will be ‘James John, Henry Howard, Gilbert Danny’. [1]  
**(b)** Perform  $N^{\text{th}}$  tuple index subtraction by K. For example, if  $N=2$ ,  $K=3$ , and input is [(4,5,6), (7,4,2), (9,10,11)], then output is [(4,2,6), (7,1,2), (9,7,11)]. [2]

(c) Raise elements of list as power and print them as tuple. For example, if list1=[10,4,5,6] and list2=[5,6,7,5],  
then output is (100000,4096,78125,7776). [2]

**Q5. (a)** What will be the output of the following code?

aTuple = (100,)

print(aTuple \*3.5)

[1]

(b) Find the number and the pairs of complete strings in two sets. Two strings are said to be complete if on concatenation, they contain all the 26 English alphabets. For example, "abcdefghi" and "jklmnoqrstuvwxyz" are complete as they contain all the characters from a to z.

**Input :** set1[] = {"abcdefg", "geeksforgeeks", "lmnopqrst", "abc"}

set2[] = {"ijklmnopqrstuvwxyz", "abcdefghijklmnopqrstuvwxyz", "defghijklmnopqrstuvwxyz"}

**Output :** 7

The total complete pairs that are forming are:

"abcdefghijklmnopqrstuvwxyz"

"abcdefghijklabcdefgijklmnopqrstuvwxyz"

"abcdefghijkldefghijklmnopqrstuvwxyz"

"geeksforgeeksabcdefghijklmnopqrstuvwxyz"

"lmnopqrstabcdefghijklmnopqrstuvwxyz"

"abcdefghijklmnopqrstuvwxyz"

"abcdefghijklmnopqrstuvwxyz"

[2]

(c) A=[‘SDP’, ‘Sensors’, ‘DLD’, ‘Probability’, ‘C’]. What will be the built-in function (in correct syntax without using print) to remove and display the item ‘DLD’? [1]

(d) Now convert the above list to a set. If I want to remove only the item ‘Probability’ from the set, what will be the correct syntax for the corresponding built-in function? [1]

**Q6. (a)** What will be the output?

class A: name= ‘A’

class B: name= ‘B’

class C(B,A): pass

[1]

print(C.name)

(b) Create a *Vehicle* class with its data attributes as name, mileage, capacity. Create a class ‘Bus’ to inherit the properties of the *Vehicle* class and take an extra attribute as “NumPassenger”. Create another method as “Total Fare” and print the total cost of the ticket as 100\*capacity\*NumPassenger. Create an instance *School\_bus* of

the class 'Bus' and pass the values as "School Volvo", 12, 50, 3. Now check whether *School\_bus* is also an instance of the 'Vehicle' class. [2]

(c) Explain the concept of factorial of a number by recursion concept (using a schematic stack diagram). [2]

Q7. (a) Write a program that replaces text in a file. Your program should prompt the user to enter an old string and a new string. [2]

(b) Write a program to create a dictionary having name, rollno, age, and gender of 10 students. Input the entries according to your choice and convert the dictionary into pandas Dataframe. After converting into pandas Dataframe, perform the following operations:

- i) Slice to extract the data of students (only name, rollno, age)
- ii) Drop the rows having gender = female
- iii) Insert a new row after the third row with name= 'harry', rollno= 38, age=23 and gender= male [3]

Q8. (a) Suppose IIIT Naya Raipur wants to store its employee salary in the file **Salary.csv**. Each line in the file consists of faculty first name, last name, rank, and salary. Write a program to display the total salary for assistant professors, associate professors, full professors, and all faculty, respectively, and display the average salary for assistant professors, associate professors, full professors, and all faculty, respectively. You have to consider the ranks as Assistant Professors, Associate Professors, and Full Professors, and consider at least 10 separate entries. [3]

(b) Explain horizontal splitting of arrays in Numpy with an example. [2]

Q9. (a) What will be the output of the following codes? [2]  
np.arange(0.5,0.5) and np.linspace(0.5,0.5). Explain the outputs also [3]

(b) There are 2 ways of writing data into rows of a .csv file. Explain them with a brief example. [2]

Q10. (a) What is the difference between linear and logistic regression? [2]  
(b) Can you use logistic regression for classification between more than two classes? [1]  
(c) What is a logistic function? What is the range of values of a logistic function? [2]

Q11 (a) Show the difference between + and \* over strings and numeric values in Python with examples. [2]  
(b) Write a python program to take the user input for m and n. Create a Tuple of first m multiples of n and print that tuple. [2]

(c) What does the following python program print? [1]

*x = 10 != 9 and 29 >= 29 + 1  
x = 10 and 29 >= 29 + 1*

*y = 7/4 < 6 and not 'I am okay' > 'I am not okay'  
print(x and y)*

Q12 (a) Write a function that takes a number as an input parameter and returns the correspond text in words, for example on giving input 452, the function should return "Four Five Two". [2]  
(b) What is the output of the following python code? [2]

A=[1,2,3,4,5]

C=[X\*\*2+Y\*\*2 for X,Y in zip(A,A)]

print(C)

[1]

(c) what does a function return by default in python?

Q.13 (a) How can you capitalize the first letter of a string? (State the built-in function)

[1]

(b) Define a class *Rectangle*. The class should contain sides: *length* and *breadth* of the rectangle as data members It should support the following methods:

[2]

- (i) `__init__` for initialization of data members.
- (ii) `setSize` for updating the length and breadth of the rectangle.
- (iii) `perimeter` for finding the perimeter of the rectangle.

[2]

(c) What is the output of the following code?

```
i=0
while (i<=10):
    for j in range (0,i,2):
        print (j,end= ' ')
    print (end= '\n')
    i +=2
```



डॉ. श्यामप्रसाद मुखर्जी अंतरराष्ट्रीय सूचना प्रौद्योगिकी संस्थान

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**END SEM EXAMINATION, Autumn-2022-2023**

**Branch & Year:** ECE/ CSE/ DSAI; 2022-2023

**Semester:** I

**Subject:** Digital Logic Design

**Subject Code:** EC101C

**Instructor Code:** MA/RBC

**Max Marks:** 50

**Duration:** 3 Hours

**Date:** 23.02.2023

The figures in the right margin indicate full marks.

Answer all the parts of a question together in a single place.

Candidates are required to give their answer in their own words as far as applicable.

Unless otherwise specified, the notations / symbols have their usual meanings.

1. Anwar 10

[ $10 \times 2 = 20$ ]

1 (a). Convert the hexadecimal number 7B.AC to base 2 and base 4.

1 (b). Subtract the following using 2's compliment method  $(65)_8 - (12)_8$ .

1 (c). Given the Boolean function:

$$F = \bar{x}y + yz + \bar{x}\bar{z}$$

Implement it with only OR and NOT gates.

1 (d). Find the complement of the following Boolean function:

$$F = (x + y + z)(\bar{x} + z)(\bar{x} + \bar{y})$$

1 (e). What is the Don't-care condition in K-maps?

1 (f). What are the difference between combinational circuit and sequential circuit?

1 (g). Explain the terms: (i) bit, (ii) byte, (iii) nibble and (iv) word length.

1 (h). Convert  $(1011)_2$  to Gray Code

1 (i). Write the characteristic equation of a JK flip-flop.

1 (j). What is the maximum possible range of bit-count specifically in n-bit binary counter consisting of 'n' number of flip-flops?



डॉ. श्यामा प्रसाद मुखर्जी अंतरराष्ट्रीय सूचना प्रौद्योगिकी संस्थान

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**END TERM EXAMINATION AUTUMN, 2023**

**Branch & Academic Year:** ECE/CSE/DSAI (2022-23)

**Semester:** I

**Subject:** Environmental Engg & SDG

**Subject Code:** HS103C

**Instructor Code:** PPP/PKS

**Max Marks: 50**

**Duration: 120 Minutes**

**Date:** 02/03/2023

**Instruction:** (Read the instructions under each section **very carefully**)

**Section A (All questions are compulsory)**

**Choose the most appropriate option**

1. Endemic species are [1]  
A. rare species  
B. species localised in a specific region  
C. cosmopolitan in distribution  
D. critically endangered species
2. The complex network of interconnected food chains is called \_\_\_\_\_ [1]  
A. Trophic level  
B. Food web  
C. Ecological pyramid  
D. Ecology chain
3. The Red Data Book contains data of [1]  
A. all plant species  
B. all animal species  
C. economically important species  
D. threatened species
4. First National Park in India [1]  
A. Jim Corbett National Park  
B. Bandipur National Park  
C. Gir National Park  
D. Sunderbans National Park
5. Biodiversity [1]  
A. Increases towards the equator  
B. Decreases towards the equator  
C. Remains the same throughout the planet  
D. Has no effect on change in latitude
6. The ozone layer in the atmosphere acts as an efficient filter for: [1]  
A. X-rays  
B. Ultra Violet rays  
C. Gamma rays  
D. Infrared rays
7. The earth's atmosphere is divided into layers based on the vertical profile of [1]  
A. Air pressure  
B. Air temperature  
C. Air density  
D. Wind speed
8. The term Ecosystem was coined by [1]  
A. Odum  
B. Clements  
C. Arthur G Tansley  
D. Elton
9. In the context of MDG & SDG declared by the United Nations, MDG stands for [1]  
A. Minimum Development Goals  
B. Millennium Development Goals  
C. Modal Development Goals  
D. Moderate Development Goals
10. In the context of Green Manufacturing, RoHS stands for: [1]  
A. Recycling of Harmful Substances  
B. Reuse of Harmless Substances  
C. Rescue of Hazardous Substances  
D. Restriction of Hazardous Substances

**Section B (Answer any three)**

**Differentiate between the following pair of terms**

1. Greenhouse effect and Global warming [3]
2. National Parks and wild-life sanctuaries [3]
3. Food chain and Food web [3]
4. Biotic potential and carrying capacity [3]

**P.T.O.**



डॉ. श्यामा प्रसाद मुखर्जी अंतर्राष्ट्रीय सूचना प्रौद्योगिकी संस्थान

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**Section C (Answer any five)**

**Essay-type questions**

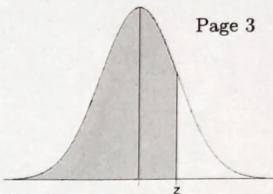
5. Explain in detail the spheres of the earth. How they are interlinked with each other? [5]
6. Explain the various components of an ecosystem. What role do biotic components play in the functioning of an ecosystem? [5]
7. Discuss the various values of biodiversity and measures for its conservation. [5]
8. What is sustainable development? Briefly describe the various SDGs approved by the United Nations General Assembly in 2015. [5]
9. How are the environmental problems in terms of the availability of resources, related to population growth? [5]
10. What are biogeochemical cycles? Explain by taking an example of one biogeochemical cycle. [5]

**Note: Answer this section in the separate supplementary notebook**

**Section D: Green Computing (Answer any two)**

11. Explain the meaning of the term “DEMATERIALIZATION” in the context of Green Computing. Write two examples of how electronic devices have helped in dematerialization. [3]
12. What is meant by “GREEN DISPOSAL” of electronic equipment? Write two examples of green disposal of electronic goods. [3]
13. Write three approaches to green computing that you would like to implement in your institute. [3]

-----X-----

**Standard Normal Cumulative Probability Table**

Cumulative probabilities for POSITIVE z-values are shown in the following table:

<b>z</b>	<b>0.00</b>	<b>0.01</b>	<b>0.02</b>	<b>0.03</b>	<b>0.04</b>	<b>0.05</b>	<b>0.06</b>	<b>0.07</b>	<b>0.08</b>	<b>0.09</b>
<b>0.0</b>	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
<b>0.1</b>	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
<b>0.2</b>	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
<b>0.3</b>	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
<b>0.4</b>	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
<b>0.5</b>	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
<b>0.6</b>	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
<b>0.7</b>	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
<b>0.8</b>	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
<b>0.9</b>	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
<b>1.0</b>	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
<b>1.1</b>	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
<b>1.2</b>	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
<b>1.3</b>	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
<b>1.4</b>	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
<b>1.5</b>	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
<b>1.6</b>	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
<b>1.7</b>	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
<b>1.8</b>	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
<b>1.9</b>	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
<b>2.0</b>	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
<b>2.1</b>	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
<b>2.2</b>	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
<b>2.3</b>	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
<b>2.4</b>	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
<b>2.5</b>	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
<b>2.6</b>	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
<b>2.7</b>	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
<b>2.8</b>	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
<b>2.9</b>	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
<b>3.0</b>	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990
<b>3.1</b>	0.9990	0.9991	0.9991	0.9991	0.9992	0.9992	0.9992	0.9992	0.9993	0.9993
<b>3.2</b>	0.9993	0.9993	0.9994	0.9994	0.9994	0.9994	0.9994	0.9995	0.9995	0.9995
<b>3.3</b>	0.9995	0.9995	0.9995	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996	0.9997
<b>3.4</b>	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9998

## Digital Logic Design

### MCQ Test-2 (1st Semester)

Date: 22.02.2023; Time: 6.15 PM – 6.45 PM

Maximum Marks: 30 (1 mark is awarded for each correct answer while -1/4 mark is for every wrong answer).  
(Electronic devices are strictly prohibited during this test)

Q1) Half-adders have a major limitation in that they cannot \_\_\_\_\_

- (a) Accept a carry bit from a present stage
- (b) Accept a carry bit from a next stage
- (c) Accept a carry bit from a previous stage
- (d) Accept a carry bit from the following stages

Q2) How many AND, OR and EXOR gates are required for the configuration of full adder?

- (a) 1, 2, 2
- (b) 2, 1, 2
- (c) 3, 1, 2
- (d) 4, 0, 1

Q3) What is ripple carry adder?

- (a) The carry output of the lower order stage is connected to the carry input of the next higher order stage
- (b) The carry input of the lower order stage is connected to the carry output of the next higher order stage
- (c) The carry output of the higher order stage is connected to the carry input of the next lower order stage
- (d) The carry input of the higher order stage is connected to the carry output of the lower order stage

Q4) What distinguishes the look-ahead-carry adder?

- (a) It is slower than the ripple-carry adder
- (b) It is easier to implement logically than a full adder
- (c) It is faster than a ripple-carry adder
- (d) It requires advance knowledge of the final answer

Q5) If the number of n selected input lines is equal to  $2^m$  then it requires \_\_\_\_\_ select lines.

- (a) 2
- (b) m
- (c) n
- (d)  $2^n$

$$n = \log_2 m$$

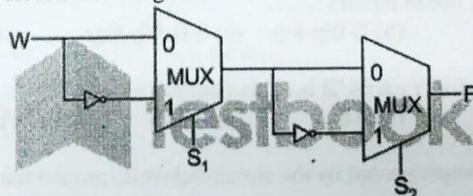
Q6) In 1-to-4 demultiplexer, if select lines C1 = 1 & C2 = 1, then the output will be \_\_\_\_\_

- (a) Y0
- (b) Y1
- (c) Y2
- (d) Y3

Q7) Which combinational circuit is renowned for selecting a single input from multiple inputs & directing the binary information to output line?

- (a) Data Selector
- (b) Data distributor
- (c) Both data selector and data distributor
- (d) DeMultiplexer

Q8) Consider the logic circuit shown in Figure



Which one of the following Boolean function is realized by the circuit. (Where XOR represent Ex-OR operation and ' represents invert operation)

- (a)  $F = W \cdot S_1 \cdot S_2$
- (b)  $F = W \cdot S_1 + W \cdot S_2 + S_1 \cdot S_2$
- (c)  $F = W' + S_1 + S_2$
- (d)  $F = W \text{ XOR } S_1 \text{ XOR } S_2$

Q9) If two inputs are active on a priority encoder, which will be coded on the output?

- (a) The higher value (b) The lower value (c) Neither of the inputs (d) Both of the inputs

Q10) One that is not the outcome of magnitude comparator is \_\_\_\_\_

- (a)  $a > b$  (b)  $a - b$  (c)  $a < b$  (d)  $a = b$

Q11) Which one is a basic comparator?

- (a) XOR (b) XNOR (c) AND (d) NAND

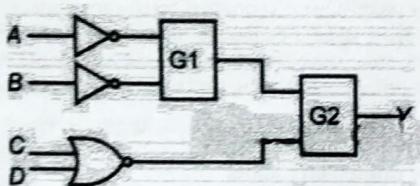
Q12) All the comparisons made by comparator is done using \_\_\_\_\_

- (a) 1 circuit (b) 2 circuits (c) 3 circuits (d) 4 circuits

Q13) Comparators are used in \_\_\_\_\_

- (a) Memory (b) CPU (c) Motherboard (d) Hard drive

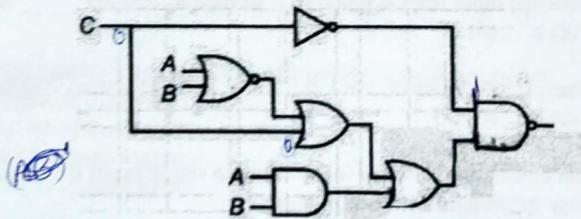
Q 14) In the figure shown, the output  $Y$  is required to be  $Y = AB + (CD)'$ . The gates G1 and G2 must be, respectively,



A	B	$\bar{A}$	$\bar{B}$	AB	$(AB)'$
0	0	1	1	0	1
0	1	1	0	D	0
1	0	0	1	0	0
1	1	0	0	1	N

- (a) OR, NAND (b) NAND, OR (c) NOR, OR (d) AND, NAND

Q 15) In the circuit shown in the figure, if  $C = 0$ , the expression for  $Y$  is



$$\begin{aligned} & AB' + 0 \\ & = (AB' + AB) \cdot \\ & A(B+B') + 1 \end{aligned}$$

- (a)  $Y = AB' + A'B$  (b)  $Y = A + B$  (c)  $Y = A'B'$  (d)  $Y = AB$

Q 16) Which flip-flop can use as buffer?

- (a) J-K flip flop (b) D flip-flop (c) S-R flip-flop (d) T flip flop

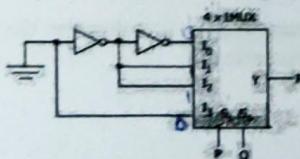
Q 17) The Logical expression  $Y = A + A'B$  is equivalent to

- (a)  $A + B$  (b)  $AB$  (c)  $A'B$  (d)  $A' + B$

$$\begin{aligned} & 0 + 1 \cdot 1 \\ & 0 + 1 \\ & 1 + 0 \cdot 1 \end{aligned}$$

$$\begin{aligned} & A + \bar{A}B \\ & (A + B)' + AB \\ & A'B' + AB \cdot 1 \end{aligned}$$

Q 18) The logic function implemented by the circuit below is (ground implies a logic "0") 1.



$$1 + 0 = 1$$

- (a)  $F = \text{AND}(P, Q)$  (b)  $F = \text{OR}(P, Q)$  (c)  $F = \text{XNOR}(P, Q)$  (d)  $F = \text{XOR}(P, Q)$

2	33
2	16
2	8
2	4
2	2
2	1

2	32
2	16

Q 19) Without any additional circuitry, an 8:1 MUX can be used to obtain

- (a) Some but not all function of 3 variables
- (b) All functions of three variables and No function of 4 Variables
- (c) All function of 3 variables and some function of 4 variables
- (d) No function of 3 variables and 4 variables

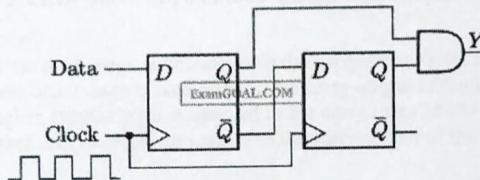
Q 20) Decimal 43 in Hexadecimal and BCD number system is respectively

- (a) B2, 01000011
- (b) 2B, 01000011
- (c) 2B, 00110100
- (d) B2, 01000100

$$\begin{array}{r} 4 \quad 3 \\ \times 100 \quad 0011 \\ \hline \end{array}$$

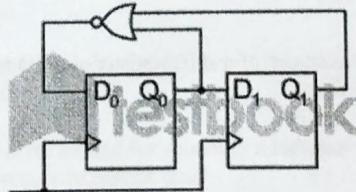
$$\begin{array}{r} 16 \quad 43 \\ \times 16 \quad 2 \\ \hline 16 \quad 2 \\ 0 \quad 2 \\ \hline 11-B \end{array}$$

Q 21) When the output Y in the circuit below is '1' (considering all the Q outputs as 0 initially), it implies that data has



- (a) Changed from 0 to 1
- (b) Changed from 1 to 0
- (c) Can change in either direction
- (d) Not changed

Q 22) For the circuit shown, the counter state ( $Q_1Q_0$ ) follows the sequence (Considering initially all the outputs are zero).



- (a) 00,01,10,11,00...
- (b) 00,01,10,00,01...
- (c) 00,01,11,00,01....
- (d) 00,10,11,00,10....

Q 23) In J K Flip Flop, if  $J = K'$ , then Flip Flop act as a

- (a) T Flip Flop
- (b) D Flip Flop
- (c) Encoder
- (d) Decoder

Q 24) Three T Flip Flop are connected to form a counter, maximum number of states possible are

- (a) 5
- (b) 6
- (c) 7
- (d) 8

Q 25) In a Ripple counter if  $Q'$  is given as positive edge triggered clock to the next FF, then the counter designed is

- (a) UP counter
- (b) DOWN Counter
- (c) Not a Counter
- (d) None of the Above

Q 26) Why is the extent of propagation delay in synchronous counter much lesser than that of asynchronous counter?

- (a) Due to clocking of all flip flops at the same instant
- (b) Due to increase in number of states
- (c) Due to absence of connection between output of preceding flip flop and clock of next one
- (d) Due to absence of mode control operation

Q27) A MOD-16 ripple counter is holding the count  $1010_2$ . What will the count be after 33 clock pulses?

- (a)  $1011_2$
- (b)  $1010_2$
- (c)  $1000_2$
- (d)  $1101_2$

$1010$       19.

Q28) For a ring counter, the number of output states are always equal to \_\_\_\_\_

- (a) Number of input states
- (b) Number of clock pulses
- (c) Number of registers
- (d) Number of flip flops

Q29) How can parallel data be taken out of a shift register simultaneously?

- (a) Use the  $Q$  output of the first FF.
- (b) Use the  $Q$  output of the last FF.
- (c) Tie all of the  $Q$  outputs together.
- (d) Use the  $Q$  output of each FF

Q30) Which is the characteristic equation of J-K flip-flop?

- (a)  $Q(n+1)=JQ(n)+K'Q(n)$
- (b)  $Q(n+1)=J'Q(n)+KQ'(n)$
- (c)  $Q(n+1)=JQ'(n)+KQ(n)$
- (d)  $Q(n+1)=JQ'(n)+K'Q(n)$



### Dr. SPM International Institute of Information Technology Naya Raipur

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### Quiz-1

Branch : B. Tech 2022 - 26      Year : I      Semester : I  
Subject : Probability & Statistics      Subject Code : MA106C      Instructor Code : Rkb  
Time : 30 min      Date : 20.12.2022      Maximum Marks : 20

Instructions: Answer all the questions.

1. From a pack of 52 cards, event A is defined as drawing a King card, event B is defined as drawing a Jack or Queen card, and event C is defined as drawing a Heart card. Then find the pairs of events which are independent. [4]

2. Three coins are tossed simultaneously and consider the following events. [3]

P is the event of getting at least two heads.

Q is the event of getting no heads.

R is the event of getting heads on the second coin.

Find the pairs of events which are mutually exclusive?

3. The following table presents the opinions of first-year B. Tech students about the syllabus of this quiz exam: [8]

	Random variable topic is included (RV)	Random variable topic not is included (NRV)	Total
CSE	25	36	61
DSAI	26	34	60
ECE	27	33	60
	78	103	181

If one of the first-year students is selected randomly, find

- $P(RV)$ ,
- $P(CSE)$ ,
- $P(NRV | DSAI)$ ,
- $P(ECE \cup CSE | NRV)$ ,
- Write in words, what is the meaning of each event.
- Assume that a random student spreads a rumour that the random variable topic is included in the quiz syllabus. What is the probability that the student is from DSAI?

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