

Mid Sem Exam
Spoken and Written Communication (HS 101)
Marks-30
Duration- 120 minutes

Answer the following questions (Word Limit: Min. 120- Max. 200 each)-

1. What is the difference between listening and hearing? Explain Biased listening and Appreciative listening with examples. (3)
2. What is the full form and function of CC and BCC in emails? (3)
3. Name and explain the basic model of communication with the help of a diagram. (3)
4. How does the setting of "Genes" by Sudha Murthy make a transition from the concept of an ideal world to the brutal harsh realities? (3)
5. Name and explain any five faulty listening habits? (3)
6. What form of nonverbal communication is associated with Haptics? Why is Haptics important in communication? (3)
7. What is Monochronic time and culture? (3)
8. Are uniforms a form of nonverbal communication? Elaborate. (3)
9. Large corporate organizations should not be permitted to operate in smaller towns and communities because they force local enterprises out of business. Comment. (3)
10. What are proxemics violations? Elaborate. (3)

- Instructions: 1. Clearly write your name and roll number on the top of question paper and Answersheet.
 2. Solutions must be written clearly.
 3. Do not write anything on question paper.
 4. Use last page of your answersheet for rough work.
 5. No electronic device is allowed.
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1. Answer True/False to the following sentences. 5 Marks

 - (a) $\forall x(P(x))$, where domain of $x = \mathbb{R}$ and $P(x) = x^2 + 1 < 0$ is a proposition.
 - (b) 1729 is a prime number or if x is a multiple of 2 then -2 divides x .
 - (c) An integer $n > 1$ is a prime iff its only divisors are 1 and n itself.
 - (d) For any two distinct prime numbers p, q , $p^{q-1} \bmod q = 1$.
 - (e) $\{\emptyset\} \times \mathbb{N}$ is an empty set.

2. Find $1 + \frac{1}{2} + \frac{1}{4} + \dots + \frac{1}{256}$. What can you say about $1 + \frac{1}{2} + \frac{1}{3} + \dots + \frac{1}{256}$? 2 Marks
3. Convert $(2023)_{10}$ to binary and octal form. 4 Marks
4. Let i be the last digit of your student id. Is $|(-3, i)| = |[i, 15]|$? If yes then prove it else give justification. 3 Marks
5. Prove or disprove there is a bijective function from $\mathbb{Z} \times \mathbb{Z}$ to \mathbb{Z} . What kind of proof did you use? 3 Marks
6. Find all $x \in \mathbb{Z}$ such that $2x \equiv 2 \pmod{13}$, $x \equiv 2 \pmod{15}$, $x \equiv 3 \pmod{7}$ 4 Marks
7. What can you conclude if you meet three people (A, B, C) on the island of knights, knaves and spies. Knights who always tell the truth, knaves who always lie, and spies who can either lie or tell the truth. First one, A, says that "C is the knave" and B says that "A is the knight" and C says that "I am the spy"? If you can not conclude about someone then list all the possibilities. 3 Marks
8. Find $\text{GCD}(2^a - 1, 2^b - 1)$ for $a, b > 0$. Give proof. 3 Marks
9. What can you say about cardinality of $\{f : \mathbb{N} \rightarrow \{0, 1, 2, \dots, 9\} | f \text{ is a function.}\}$? Give justification. 3 Marks

Indian Institute of Information Technology Vadodara
Mid Semester Examination (Autumn, 2022-23)
Course: EC100 Basic Electronic Circuits

Full Marks: 80

Date: 19/01/2023
Time: 2:00 PM - 4:00 PM

Instructions:

1. Attempt **ALL** the questions. Each question carries equal marks.
2. Answer each question sequentially beginning on a new page.

- Q1.** In the circuit shown in Fig.1, determine the value of current I_2 and the voltage drop V across the 15 ohm resistor.

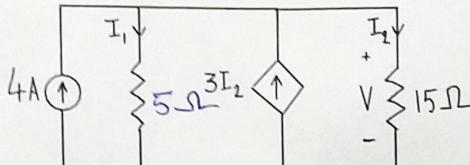


Fig. 1

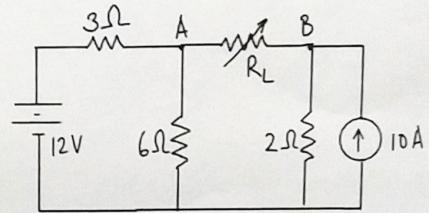


Fig. 2

- Q2.** Apply Thevenin's theorem across the terminals A and B in the circuit shown in Fig. 2. Draw the Thevenin equivalent circuit mentioning the value of Thevenin voltage and resistance. Determine the current flowing through R_L when its value is 4 ohm.
- Q3.** A silicon sample is doped with $4 \times 10^{15} \text{ cm}^{-3}$ phosphorus atoms from one end and $6 \times 10^{15} \text{ cm}^{-3}$ boron atoms from the other end. Determine the position of Fermi energy level with respect to the corresponding band-edge energy level (E_C or E_V) at 300 K. Draw the band diagram and show the energy levels. [Assume effective density of states in both conduction and valence band is $1 \times 10^{19} \text{ cm}^{-3}$ at 300 K]

- Q4.** A *p-n* homojunction semiconductor device is biased in the following conditions:

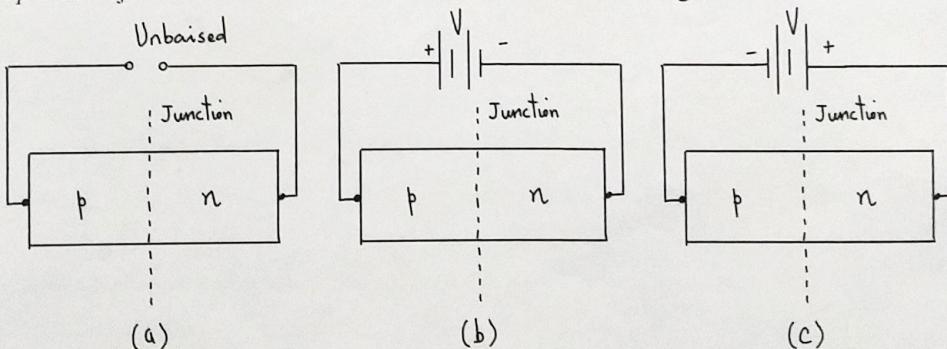


Fig. 3.

In each of the cases, show the (a) depletion region, (b) built-in field, (c) electrostatic potential, (d) energy band diagram, (e) particle / current flow and (f) total current flow.

- Q5.** A circuit is designed on the breadboard and connected to sources and displays as depicted in Fig. 4. Show the waveform that appears on the output display.

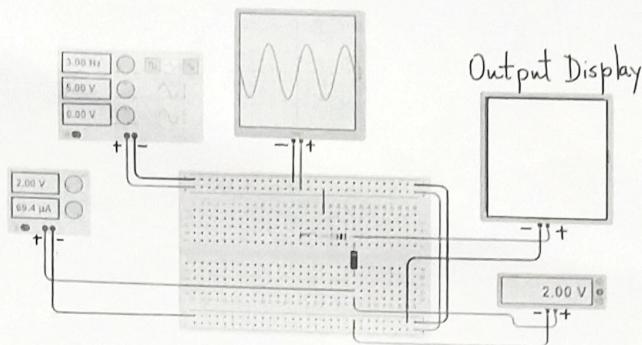


Fig. 4

- Q6.** A zener diode regulator circuit in Fig. 5 is to be designed to meet the following specification: $I_L = 10 \text{ mA}$, $V_o = 10 \text{ V}$ and V_{in} varies from 30V to 60V. The zener diode has $V_z = 10 \text{ V}$ and $I_{zk}(\text{knee current}) = 1 \text{ mA}$. What should be the range of R (in Ohms) for satisfactory operation of the voltage regulator circuit?

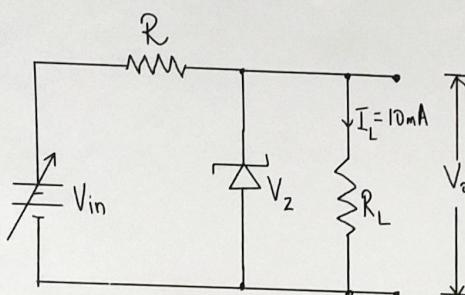


Fig. 5

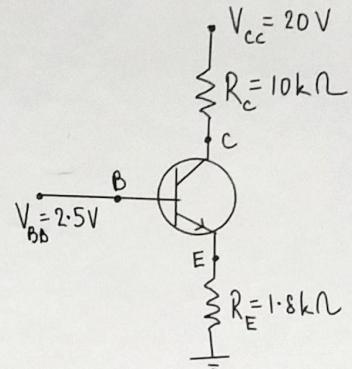


Fig. 6

- Q7.** Discuss the regions of operation in collector-current I_C versus collector-emitter voltage V_{CE} characteristics of a biased bipolar junction transistor. Plot the dc load line.

- Q8.** In Fig. 6, a bipolar junction transistor is dc biased.

(a) Determine the operating point.

(b) If the base supply voltage V_{BB} decreases by 10%, what happens to the operating point?

Mid-semester Examination 2022-23

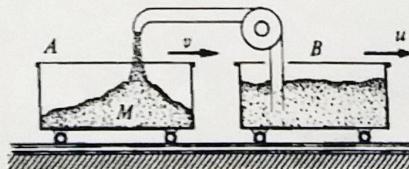
PH100: Mechanics and Thermodynamics

Time: 120 Minutes

Marks: 45

- All questions are compulsory and their marks are indicated in square brackets.
- All questions need to be answered sequentially without fail. Non-compliance with instructions will invite a deduction in marks.
- In case you feel any question/s is/are incorrect or have insufficient instruction then write in the answer book with your justification without wasting any time.

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1. Discuss the black body radiation problem. Estimate the density of standing waves in a cavity and write down the Rayleigh-Jeans formula. How Rayleigh-Jeans formula leads to ultra-violet catastrophe. [7 Marks]
 2. (a) State Kepler's laws of planetary motion.
(b) Before landing men on the moon, the Apollo 11 space vehicle was put into orbit about the moon. The mass of the vehicle was 9,979 kg and the period of the orbit was 119 minutes. The maximum and minimum distances from the center of the moon were 1,861 km and 1,838 km. Assuming the moon to be a uniform spherical body, what is the mass of the moon according to these data? $G=6.67 \times 10^{-11} \text{ N.m}^2/\text{kg}^2$. [10 Marks]
 3. (a) Consider the forced harmonic oscillation and forced damped harmonic oscillation with the driving force as $F_0 \cos(\omega_0 t)$ and the damping force as $-bv$. By plotting the displacement curve, discuss the resonance situation in both cases.
(b) A small cuckoo clock has a pendulum 25 cm long with a mass of 10 g and a period of 1 s. The clock is powered by a 200 g weight which falls 2 m between the daily windings. The amplitude of the swing is 0.2 rad. What is the Q of the clock? How long would the clock run if it were powered by a battery with 1 J capacity? [10 Marks]
 4. (a) Discuss the phenomenon of stable, unstable, and neutral equilibrium on the basis of potential energy.
(b) A particle of mass m and velocity v_0 collides elastically with a particle of mass M initially at rest and is scattered through angle θ in the center of the mass system. (i) Find the final velocity of m in the laboratory system. (ii) Find the fractional loss of kinetic energy of m . [10 Marks]
 5. (a) What you understand from inertial and non-inertial frame of reference. Discuss with example of both.
(b) Material is blown into cart A from cart B at a rate b kilograms per second. The material leaves the chute vertically downward, so that it has the same horizontal velocity as cart B, u . At the moment of interest, cart A has mass M and velocity v , as shown. Find dv/dt , the instantaneous acceleration of A. [8 Marks]



Indian Institute of Information Technology Vadodara

B.Tech. (CSE) Semester I (Autumn 2023)

Introduction to Programming and Problem Solving (IT101)

Mid Semester Exam (Marks 30)

Time: 120 Minutes

Note: (a) Attempt all questions.

- (b) Answer must be written precise and to the point instead of using verbose.
- (c) Mention **explicitly** any assumptions if used while answering the question.

Questions

QUS01: Answer the following questions **(5 Marks)**

- (a) Which register of the CPU is responsible to execute the next instruction of a program?
- (b) What is data type? In one line definition each, define primitive(implicit), derived and user-defined data types. (Be Brief).
- (c) Why pointer and array are called derived data types? (Be Brief).
- (d) Name the five different stages of a C program. (Don't Describe them. Just Name Them).

QUS02: A variable is defined in the following way: **(4 Marks)**

`static const unsigned int num = 5;`

- (a) What will be scope of the variable, number, if the above statement is defined within a function within a file?
- (b) What will be scope of the variable, number, if the above statement defined outside all functions within a file?
- (c) What is identifier, modifier, datatype, qualifier, storage class and literal in the above statement? Make the table given below and fill the name details against all tokens.

Token	Name
static	
const	
unsigned	
int	
num	
=	operator
5	

QUS02: What are the problems with the following C codes:

(3 Marks)

- (a) unsigned float num = 5.2;
- (b) int *x;
 *x = 5;
- (c) int x = 5;
 if (x=0) { // do something}

QUS03: What will be the output for the following codes:

(3 Marks)

- (a) #include <stdio.h>
 #define ArrSize 5
 int main(void)
 {
 int Arr[ArrSize] = {2,1,3,5,4}; int temp; int count=0;
 temp = Arr[count];
 for(count=1;count<ArrSize;count++)
 {
 if(temp<Arr[count])
 temp=Arr[count];
 }
 printf("\nFinal Value is %d", temp);
 return 0;
 }
- (b) int a = 5; int b = 10;
 b = a - b; a = b - a; b = a - b;
 printf("\nValue of a and b are: a=%d, b=%d", a,b);

QUS04: Draw a flowchart for finding out the factorial of a given unsigned integer number.

(3 Marks)

QUS05: What is call by value and call by reference method? Write the C program for the functions, void BAD_SWAP(int, int) and void SWAP(int*, int*). Don't write the main program calling these functions.

(3 Marks)

QUS06: Write a C Program to evaluate and print the sum of the following series:

$$S = \frac{1}{1} + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5} + \frac{1}{6} + \frac{1}{7} + \frac{1}{8} + \frac{1}{9} + \frac{1}{10}$$

The answer should be printed up to 3 decimal places.

(3 Marks)

QUS07: Write an algorithm and C program to print the sum of all prime numbers that occur before 20. Note: We are **NOT** looking for an efficient way to find a prime number. Hence, Write the prime number portion of the code in a simple logic.

(6 Marks)